IRON AND STEEL SCRAP IN CALIFORNIA AND NEVADA

By George C. Branner

* * * * * * * * * * * * information circular 7973

UNITED STATES DEPARTMENT OF THE INTERIOR
Fred A. Seaton, Secretary

BUREAU OF MINES
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IRON AND STEEL SCRAP IN CALIFORNIA AND NEVADA[1/]

by

George C. Branner[2/]

INTRODUCTION AND SUMMARY

This Bureau of Mines report presents information on the origin, collection, movement, and consumption of iron and steel scrap in California and Nevada. As far as practicable, information is presented on a grade basis.

The iron and steel scrap industry in California is important from the standpoint of employment, economic essentiality, and dollar value. About 16,000 persons are either directly or indirectly employed on a full- or part-time basis in the collection, preparation, and sale of iron and steel scrap in California; in 1957 about 70 percent of the tonnage of products of California steel mills, valued at $271 million, was derived from scrap; the value of scrap in 1957 ($117 million) is about $10 million greater than the value of portland cement produced in California that year. The iron and steel scrap industry in Nevada is small.

The California consumption of scrap in steel manufacture differs somewhat from the national average. In 1957, 45 percent of the aggregate tonnage of the pig iron and scrap charged into domestic steel furnaces was scrap. In California the percentage was 64. This difference is due to the fact that there is only one integrated steel mill in California--Kaiser Steel Corporation--whereas, of the remaining 10 mills, 8 use 100 percent scrap, and 2 use over 75 percent scrap.

Although the preparation and sale of scrap to consumers is a dealer function throughout most of the United States, the California industry is unique in that several steel ingot producers buy directly over the scale and operate their own preparation yards and to that extent eliminate the dealer as a middleman.

California contains two well-defined areas of source, collection, preparation, and consumption--the Los Angeles and the San Francisco areas. These areas are self-sufficient in all respects, except for minor tonnages of certain grades of scrap which flow between them. For this reason many of the

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1/ Work on manuscript completed June 1960.

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tables included in the text divide the data into those for southern and northern California. Unless otherwise specified, southern California includes the 10 counties south of the north boundary of San Luis Obispo, Kern, and San Bernardino Counties, and northern California includes the remainder of the state.

The demand for home and purchased scrap in California and Nevada was about 3,342,000 gross tons in 1957. The California portion was divided about 60 percent to 40 percent between the Los Angeles and San Francisco areas. Foreign exports from these areas have been an important factor in sustaining demand and price since 1953, and in 1957 they were 24 percent of the total demand.

The scrap industry is now highly competitive, and capital requirements have been increasing steadily for the past 20 years or more. Larger, more powerful, and more costly preparation machinery has come into use. A modern scrapyard can easily have equipment investments exceeding $1 million.

Increased use of the oxygen converter in steel manufacture instead of the open-hearth furnace probably will reduce the scrap requirements per ton of steel output in California in the next 10 or 15 years, because the charge requirements for scrap in the oxygen converter are substantially less than those in the open-hearth furnace, if accompanied by an adequate hot metal supply.

Steel ingot production in California of 2,535,686 net tons in 1958, compared with the estimate of Kaiser Steel Corp. of 4,282,000 net tons of steel-mill product receipts in California during the year, indicates that the steel production was about 60 percent of the potential for the year. However, the mill products do not include the steel brought into the State in the form of manufactured goods that may be manufactured partly in California in the future.

The price of scrap in California is directly related to demand. An average increase in price of approximately 7 percent for each 100,000 gross tons increase in demand from 1938 to 1957 has been calculated.

Exact reserves of scrap in California are not known, but indications are that past consumption plus exports have been insufficient to deplete reserves to a point where a shortage is known to exist. One estimate is that the reserves in 1957 were sufficient to last 28.7 years at the rate of new scrap consumption for that year.

All tonnage figures, except in two specified instances, are in gross tons of 2,240 pounds.

ACKNOWLEDGMENTS

Gathering the data contained in this circular necessitated contact with about 60 dealers, dealer-brokers, and brokers, 20 consumers, 10 automobile wrecking yards, and many others indirectly connected with the iron and steel scrap industry. Without their consistently generous assistance this circular

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could not have been prepared. Especial acknowledgment of valuable assistance is due to officials of the Learner Co., Oakland; Associated Metals Co. of California, Oakland; Kaiser Steel Corp., Oakland; Luria Bros. & Co., San Francisco and New York; Pacific States Steel Corp., Niles; Purdy Co., South San Francisco; Berg Pipe and Steel Corp., Los Angeles; Southwest Steel Rolling Mills, Los Angeles; Federal Trade Commission, Washington, D.C.; Maritime Administration of the Department of Commerce, San Francisco office; Motor Car Delears Association of San Francisco, and District Freight Office of the Southern Pacific Co., San Francisco. Valuable suggestions were provided by Dr. N. H. Stearn, Menlo Park; Don M. Patterson, of the Stauffer Chemical Co., San Francisco; and E. C. Barringer and William S. Story, of the Institute of Scrap Iron and Steel, Washington, D. C.

The author is indebted to the Berg Pipe and Steel Corp. for illustrations appearing as figures 2, 4, 5, 6, and 19 in this report.

HISTORY

The first iron foundries and forges on the west coast were built in San Francisco to meet the demand for iron products in the years during and following the gold rush of 1849. The principal raw material for these operations was scrap iron from railroad and mine machinery, which had been brought from the east coast by sailing vessels around Cape Horn. During that period and up to 1910, there were no iron and steel scrap dealers such as exist today. Collectors of scrap iron operated junkyards and dealt in paper, rags, bottles, and metals. With the gradual growth of the steel manufacturing industry on the the Pacific coast the demand for iron and steel scrap grew steadily as the lack of developed iron ore supplies and coking coal made the steel producers more dependent on scrap as a raw material. From 1935 to 1957, the expansion of steel production in California has been nearly paralleled by the growth of scrap consumption.

The oldest operating steel mill in California is that of the Judson Steel Corp. at Emeryville. This mill was built in 1882 by Judson Manufacturing Co., which was succeeded by the present firm in 1928; they now use 100 percent scrap. The first major steel producing operations in the State began in 1909 with the construction of two open-hearth mills, one at Pittsburg and one at South San Francisco. These were operated, respectively, by Columbia Steel Co. and Pacific Coast Steel Co. Columbia Steel Co. purchased a steel mill at Torrance from the Llewellyn Iron Works in 1923 and acquired blast-furnace and coke-oven facilities in 1924 at Provo, Utah. In 1930, United States Steel Corp. acquired all of the properties of Columbia Steel Co.; in 1952, after a major expansion, these became the present Columbia-Geneva Steel Division of United States Steel Corp. Also in 1930, Bethlehem Steel Co. purchased the properties of Pacific Coast Steel Co. and acquired a steel mill at Vernon, Los Angeles County, from Southern California Iron & Steel Co. These properties, together with a Seattle mill, were consolidated as Bethlehem Pacific Coast Steel Corp. Thus, by 1930 the steel industry was firmly established in California, but the industry was without local iron-ore supplies and blast-furnace facilities and depended on Utah pig iron and local scrap as a source of raw materials.

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The oldest operating steel mill in California is that of the Judson Steel Corp. at Emeryville. This mill was built in 1882 by Judson Manufacturing Co., which was succeeded by the present firm in 1928; they now use 100 percent scrap. The first major steel producing operations in the State began in 1909 with the construction of two open-hearth mills, one at Pittsburg and one at South San Francisco. These were operated, respectively, by Columbia Steel Co. and Pacific Coast Steel Co. Columbia Steel Co. purchased a steel mill at Torrance from the Llewellyn Iron Works in 1923 and acquired blast-furnace and coke-oven facilities in 1924 at Provo, Utah. In 1930, United States Steel Corp. acquired all of the properties of Columbia Steel Co.; in 1952, after a major expansion, these became the present Columbia-Geneva Steel Division of United States Steel Corp. Also in 1930, Bethlehem Steel Co. purchased the properties of Pacific Coast Steel Co. and acquired a steel mill at Vernon, Los Angeles County, from Southern California Iron & Steel Co. These properties, together with a Seattle mill, were consolidated as Bethlehem Pacific Coast Steel Corp. Thus, by 1930 the steel industry was firmly established in California, but the industry was without local iron-ore supplies and blast-furnace facilities and depended on Utah pig iron and local scrap as a source of raw materials.

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National Supply Co. at Torrance began making steel in 1922 and continued under the same corporate organization until 1958, when it became a subsidiary to Armco Steel Corp. Pacific States Steel Corp. at Niles was established in 1937 and continues under the original corporate organization using 100 percent scrap. Southwest Steel Rolling Mills, Los Angeles, was incorporated in 1941 and uses 100 percent scrap. In 1942, Kaiser Steel Corp. established an integrated steel plant at Fontana, San Bernardino County, with blast furnaces and developed an iron-ore supply from the Vulcan mine near Kelso, San Bernardino County. This mine was the source of Kaiser's ore from 1942 to 1948, when the Eagle Mountain iron mine was opened. The Fontana plant, in 1960, has nearly two-thirds of the annual ingot capacity of the 11 steel mills in the State. (See table 1, p. 22.)

Iron, malleable iron, and steel foundries have increased in number with the growth of California industry. Among the oldest in the San Francisco Bay area are H. C. MacCaulay Foundry, Berkeley; California Foundry, Oakland; Phoenix Iron Works, Oakland; U.S. Foundry, Oakland; Empire Foundry, Oakland; San Francisco Foundry, San Francisco. U.S. Pipe & Steel Corp., Decoto, and American Brass ¢ Iron Co., Oakland, are two of the largest now operating in the San Francisco area. Southern Pacific Co. Wheel Foundry in Sacramento is one of the large foundries in northern California.

In the Los Angeles area, The Moline Iron Works, Long Beach Iron Works, and Reliable Iron Foundry are among the oldest iron foundries. Pacific Coast Iron Pipe & Fittings Co., South Gate, is one of the largest iron foundries in the State.

ECONOMIC FUNCTION OF DOMESTIC IRON AND STEEL SCRAP INDUSTRY

According to the Bureau of the Census the domestic iron and steel scrap industry in 1958 had gross sales of $1.5 billion. The industry owes its existence largely to the domestic and foreign demand for scrap by steel mills and, to a smaller extent, to the domestic demand by iron and steel foundries and miscellaneous users. More than 98 percent of the scrap consumed in the United States is used in the production of iron and steel in some form.

The iron and steel scrap industry in California and Nevada, as in other States, consists principally of numerous small dealers--mostly family firms. There is no national market for scrap in the usual meaning of the term but rather a series of regional markets, distributed primarily near steel mill centers. Therefore, the problem of scrap availability at these centers is usually not a serious one, and the only major movements of scrap between regions occur where the regions are not widely separated, that is, in New York, Pennsylvania, Ohio, and Michigan. There are 14 regions (19)3/ usually recognized in the United States, of which 3--Seattle, San Francisco, and

3/ Underlined numbers in parenthesis refer to items in the bibliography at the end of this report. The 14 regions are Eastern Pennsylvania, Western Pennsylvania, Chicago, Buffalo, Youngstown, Southern Ohio, Northern Ohio, Birmingham, Houston, Detroit, St. Louis, Seattle, San Francisco, and Los Angeles.

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Los Angeles--are on the Pacific coast. (See fig. 1.) Each of these three regions is nearly self-sufficient, there being only minor scrap movements among them. In addition to domestic consumption, substantial tonnages for foreign export are shipped from Pacific coast ports, and these are generated almost entirely within the regions in which the ports are located.

Although large steel mills are often integrated as to iron, ore, coke, limestone, pig iron, rolling, and fabricating facilities, only a few are integrated with respect to an iron and steel scrap supply. Consequently, they must deal largely through independent channels to obtain their requirements. Small mills must do likewise. Iron and steel foundries and miscellaneous users, being only partly integrated, are faced with the same necessity. Domestic markets for home and purchased iron and steel scrap consumed about 50 million gross tons in 1958 and foreign markets an additional 3 million gross tons. The consumption of new scrap provided support for more than 4,000 dealers. The California and Nevada consumption and export markets required about 3,342,000 gross tons in 1957 and provided support for over 600 dealers, as listed in telephone directories.

Scrap supplies are collected mostly from an army of collectors or truckers, estimated roughly at 11,000, the number of which expands and contracts with the demand for and the price of scrap. Some large sources of scrap, such as railroads, shipyards, and military installations, collect their own scrap for direct sale to dealers or consumers. In addition, a steady source of scrap is provided by a substantial number of metal fabricators, either through brokers or directly to consumers. Moreover, consumers generate scrap in their own plant processes. This scrap becomes available to them for recycling.

OPERATION OF IRON AND STEEL SCRAP INDUSTRY

Classes of Scrap

Iron and steel scrap is classified either as home scrap or as purchased scrap.

Home scrap is that generated in a consumer's plant while producing iron or steel products and may include crops, clippings, borings, spillings, and discarded defective products. Scrap of this type constitutes a more or less constant proportion by weight of the consumer's total output and is normally re-used at the plant where it is generated. In California and Nevada home scrap comprised about 30 percent of the total consumption in 1957.

Purchased scrap, as the name indicates, includes any scrap which the consumer purchases. It may be scrap transferred from one plant to another of the same ownership, or it may be industrial scrap returned from a fabricator under a repurchase agreement. Most of this scrap is supplied to consumers by dealers, but some is supplied directly to consumers by sources of scrap, such as railroads, military establishments, or industrial plants. In California and Nevada, purchased scrap was about 70 percent of the consumption in 1957.

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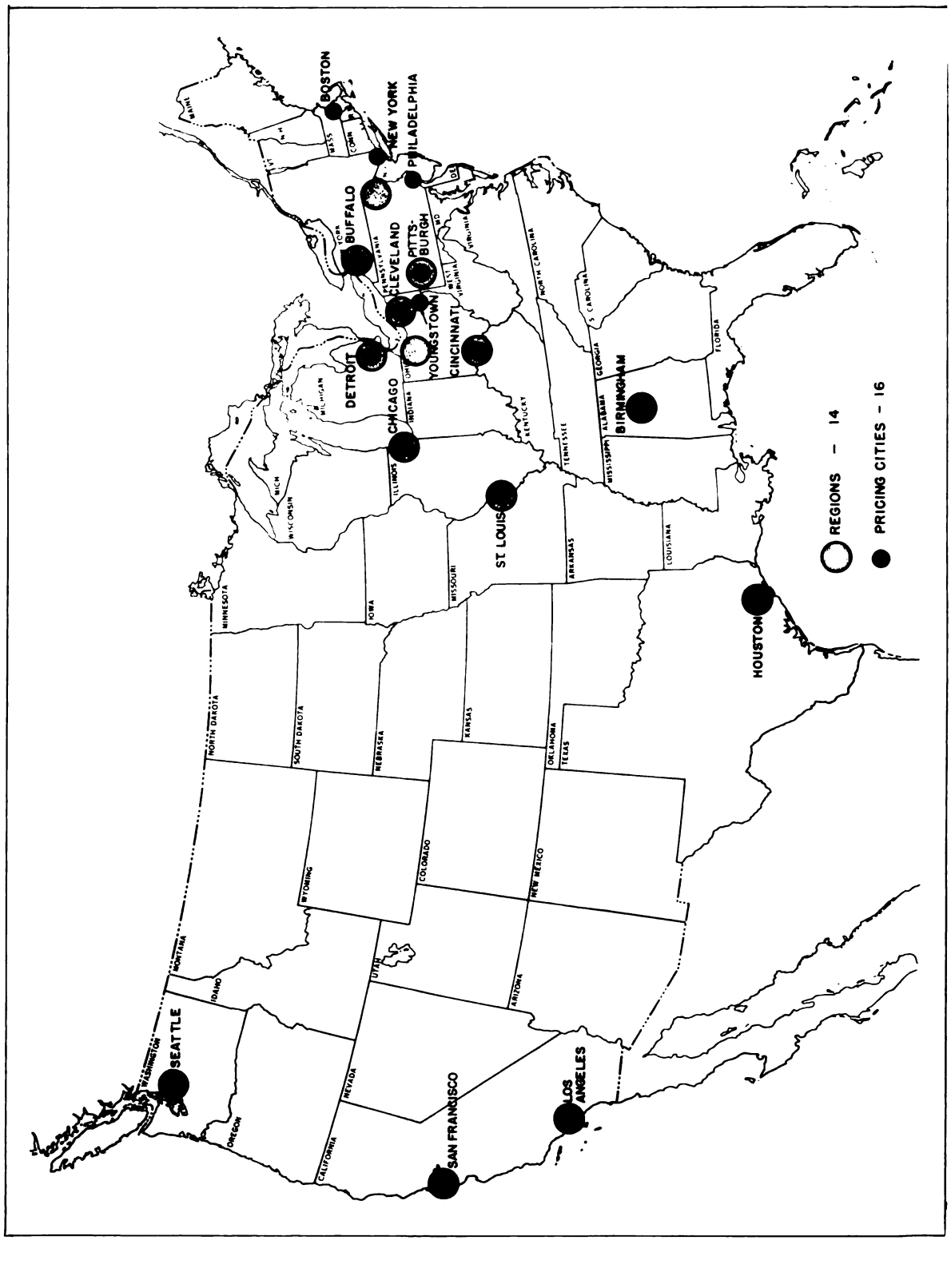

FIGURE 1. - Iron and Steel Scrap Regions and Pricing Cities of the United States, 1958. (Pricing Cities from Iron Age)

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Purchased scrap is of two classes--prompt industrial and obsolete.

Prompt industrial scrap is that generated by an industry in fabricating ferrous products and constitutes a relatively constant proportion of the plant output. Clippings, turnings, and borings are common types. (See fig. 19.) Experience has shown that domestic generation of prompt industrial scrap is closely related to domestic steel shipments. In California and Nevada, prompt industrial scrap is estimated at 5.9 percent of the annual consumption of scrap.

Obsolete scrap is that generated by the failure, corrosion, wear, or obsolescence of ferrous materials. Its supply is controlled by several factors but basically by the useful life of each item. In California and Nevada obsolete scrap comprises about 94 percent of the annual consumption of purchased scrap.

Grades of Scrap

The grades of scrap for which monthly consumption canvasses are made by the Bureau of Mines are as follows:

1. No. 1 heavy-melting steel.
2. No. 2 heavy-melting steel.
3. No. 1 and electric-furnace bundles.
4. No. 2 and all other bundles.
5. Low-phosphorus scrap.
6. Cast-iron scrap, other than borings.
7. Turnings and/or borings, alloy-free.
8. Rerolling rails.
9. Scrap rails.
10. High-speed steel.
11. Stainless steel.
12. All other alloy iron and steel.
13. All other prepared scrap.
14. Unprepared scrap.

Specifications for basic open-hearth and blast-furnace grades, electric-furnace and foundry grades, special grades, and cast-iron grades, together with grade specifications of the Association of American Railroads, are given in Appendix 1.

Basic Operations

There are three basic operations in the iron and steel scrap industry, namely, collection, preparation, and consumption. Export of scrap might also be listed, but this operation is not necessarily basic as it is subject to control or elimination by the Government.

Collection consists of gathering scrap, usually at or near the point of generation. Preparation is the sorting, cleaning, cutting, or breaking of scrap to meet consumer requirements. Consumption is the melting of scrap before producing commercial steel or iron products. Export is the shipment of prepared scrap for foreign consumption.

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Collection

Collection is discussed by class of scrap.

Home Scrap

Home scrap is generated where steel ingots and ferrous castings are made. As the quality of such scrap is known to the consumer, it is a desirable material for re-use, because its chemical composition is known. Only small tonnages of home scrap are used outside the plant where it is generated.

Purchased Scrap

Prompt industrial scrap is collected at the point of generation and is commonly baled or otherwise prepared at the generating plant for consumption. For that reason, it is sometimes sold directly by the plant to a consumer on a contract basis without passing through the hands of a dealer or broker.

Obsolete scrap is collected in various ways:

1. By a trucker, with or without a yard equipped for preliminary preparation, who collects and delivers scrap to a dealer or to a steel-ingot producer or foundry operator who prepares his own scrap. This type of collection is much more important than any other because of the tonnage collected, and the trucker's activities are the most vital part of the scrap-collecting mechanism. He may give his full or part time to scrap collection, or he may collect only periodically.

2. By a farmer, miner, oilfield worker, or other person not regularly engaged in the collection and sale of scrap who may seasonally or periodically bring to a dealer or consumer a truckload of scrap that has accumulated at his place of employment or abode.

3. By a man or team of men employed by a dealer to scout out scrap supplies.

4. By automobile wreckers, who usually wreck primarily for car parts but who ultimately sell what is left of the car to a scrap dealer after removing salable parts.

5. By a railroad company, shipyard, demolition contractor, military establishment, or other organization or individual generating scrap in the conduct of business.

Preparation

Virtually all scrap is prepared before it is consumed; that is, it must be sorted, cleaned, and cut to the size required or compressed into bales. If it is to be used for making high-quality steel ingots, it must be sorted and nonferrous or other undesirable materials entirely or largely removed. It must then either be cut to 18- to 24-inch lengths to fit the charging-box

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dimensions or compressed into bales of charging-box size and furnace-door dimensions. No. 1 Heavy Melting grade is usually limited to 18 inches by 5 feet and No. 2 Heavy Melting to 18 inches by 2 feet. Cast iron and steel for castings must be sorted, cleaned, cut or broken into required furnace-size scrap, and stripped of nonferrous materials. Preparation may begin with a trucker who has a small yard and who may do some sorting, cleaning, and cutting. However, this preparation is essentially preliminary, and the final preparation before use is usually completed by a dealer in his own yard or by a consumer who does his own preparing. Thus, the dealer yard is the foundation of the scrap business, because it serves as a reservoir for the accumulation of scrap from many sources and as a staging area from which sorted and prepared material can be channeled to the proper consuming point. (See fig. 2.)

Channels of Trade

The flow of scrap from collector to consumer or exporter takes place in one of the six ways indicated in figure 3.

FIGURE 2. - Unstripped Motor Blocks.

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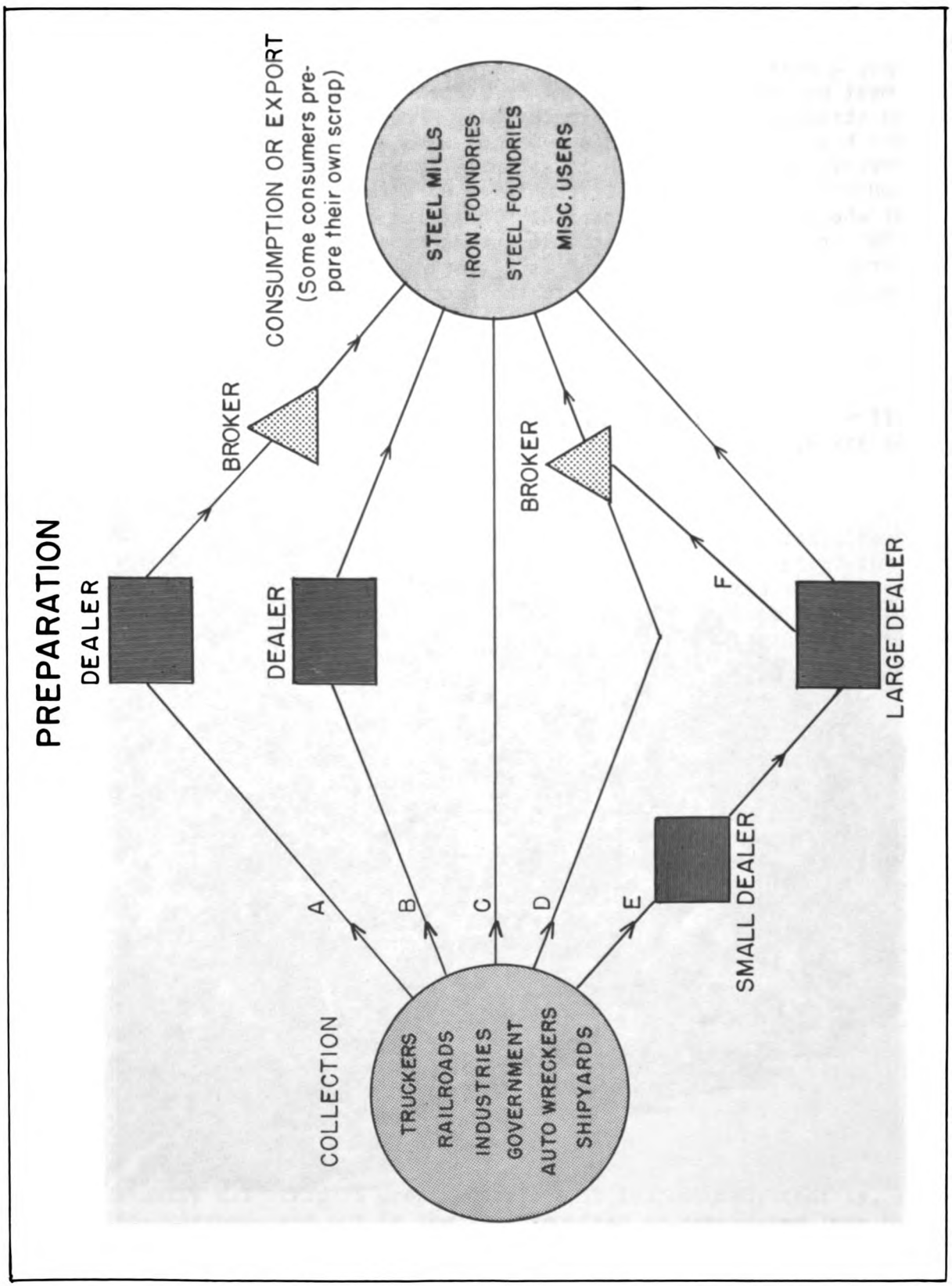

FIGURE 3. - Flowsheet of Iron and Steel Scrap from Collector to Consumer.

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Channels A and B are commonly used by collectors and dealers to market scrap which is sold to a consumer who does not prepare the scrap he purchases or scrap which originates at a point so far removed from a consumer who prepares his own scrap that the collector can only afford to sell to a nearer yard.

Channel C is used by a generator of prepared prompt industrial scrap, such as a detinning plant, or by a small collector who has only a short haul to a consumer who prepares his own scrap.

Channel D is the same as channel C, except that a broker takes title to the material to be moved at the point of collection.

Channel E is used by a small dealer who must have cash for operation. The larger dealer thus finances the smaller. A broker (channel F) may control the final movement to a consumer, as in channel A.

Transportation

Dealers' opinion regarding the flow of scrap in California is that more than 95 percent moves by truck to the dealer and about 99 percent moves by rail from the dealer to the consumer. The 5 percent that moves by rail to the dealer usually originates with railroads, military establishments, and similar groups. The 1 percent that moves by truck to the consumer is usually to a consumer who prepares his own scrap, the flow being to a preparation yard. Many consumers do not accept truck deliveries under any circumstances.

The basic reasons for these relationships are that the dealers are widely distributed over the State and deliveries by a collector of a few tons can be handled only by truck. As a rule, his one-way haul is 50 miles or less. However, some hauls may be as much as 200 miles due to unusual circumstances. Most dealers accumulate tonnage by carload lots for shipment by rail because the unit cost of transportation is less than by truck. Sometimes, the dealer cannot get cars from a railroad when he needs them and ships by truck in order to make deliveries when required.

Marketing Practices

Collector

The collector commonly hauls scrap to the buyer, who may be a dealer or consumer, and receives cash on delivery at the established rate for the grade delivered. If the collector is an industry, a railroad, or a Government source, the scrap moves by rail to a yard, and payment is usually cash on delivery. If the scrap moves directly to a consumer, payment is usually delayed about 30 days pending verification of weight and grade.

Dealer

As the dealer pays cash for his scrap, he must be adequately financed, because his cash payments to collectors may total several thousand dollars a

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day. By selling through a broker, the dealer's cash position is largely supported.

Broker

When a broker purchases scrap from a dealer, he takes title to the scrap at the yard loading point, paying the dealer 75 to 90 percent of the loaded price on receipt of the bill of lading. After the scrap has been delivered to and checked by a consumer as to weight and grade, usually in about 30 days, the consumer makes an adjusted payment to the broker who then pays the dealer the balance due. Thus, it is apparent that brokers with extensive operations require substantial financing. They usually have outstanding considerable balances due from consumers for scrap for which they have already made major payments to dealers. To a considerable degree, therefore, brokers finance the scrap purchases of consumers.

Dealer-Broker

A dealer-broker, as the name implies, functions sometimes as a dealer and sometimes as a broker, as his financial advantage may dictate.

Yard Equipment and Costs

Standard yard equipment comprises:

1. Railroad spur tracks, which permit movement to and from yards of standard-gage gondola cars for unloading and loading. They also permit the movement of diesel locomotives or locomotive cranes for shifting cars and for loading and unloading. The yard owner pays the installation cost from a point near his property line.

2. Scales, which weigh trucks before and after unloading to permit immediate payment for deliveries and usually have a capacity of 100,000 pounds. The cost is about $8,000 or $9,000 installed.

3. Shears, which are used to cut material to specification length. Those commonly in use are known as "alligator" shears. They may be motor or combustion-engine driven, fixed, or portable. Small power shears (No. 1) cost $3,200; large (No. 3) shears cost $11,500, f.o.b. factory. A few large yards have hydraulically operated guillotine-type shears with a vertically moving V-shaped upper jaw capable of exerting a pressure of 600 tons. Shears of this type costs about $250,000 installed. (See fig. 4.)

4. Torches (oxygen-acetylene or oxygen-propane hand-operated burners), which are used to cut large material that cannot be sheared. Their costs is about $50 each. Some yards are piped with oxygen and acetylene or propane: other yards purchase the gas in portable cylinders.

5. Cranes, which are used for unloading, loading, and sorting scrap. They may be automobile, tractor, or diesel-locomotive type. A few large yards operate overhead electrically operated cranes. Cranes are equipped with

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FIGURE 4. - Hydraulic Shears.

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grapples or magnets. The smaller cranes cost about $10,000; the diesel-locomotive type, $60,000 to $90,000. A 45-inch magnet assembly costs about $4,500; a 65-inch magnet, $9,850.

6. Baling presses, which compress lightweight material, usually less than 1/4 inch thick, or "tin" into compact bales weighing about 600 to 800 pounds. Modern, triple-compression balers of large capacity (400 gross tons) cost $250,000 plus installation. Smaller balers (capacity, 150 gross tons) cost about $125,000 plus installation. (See figs. 5 and 6.)

Yard Labor Costs

Contract union hourly wages of the Warehouse, Processing, and Distribution Workers Union, Local No. 26, agreed to by several of the large yards in Los Angeles, effective to October 1, 1959, were as follows:

Body-press feeder....	$ 1.982	Shearer operator (Nos. 1 and 2)....	$ 2.007
Crane operator.....	2.445	Shearer operator (Nos. 3 and 4)....	2.057
Crane helper.....	2.082	Shearer helper (Nos. 1 and 2).....	1.982
Head metal sorter....	2.215	Shearer helper (Nos. 3 and 4).....	2.032
Torchman.....	2.082	General labor.....	1.882

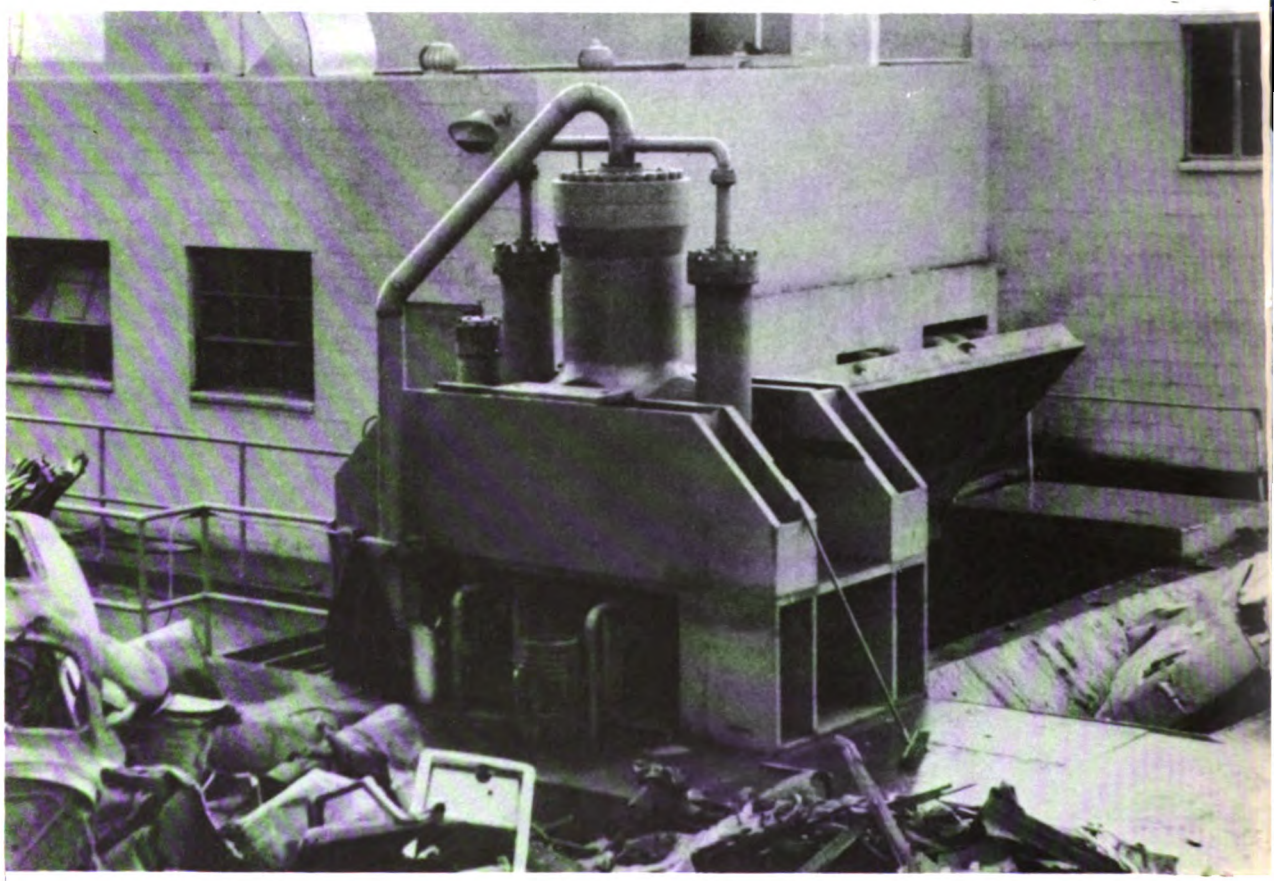

FIGURE 5. - Hydraulic Press, Power Plant and Control Room.

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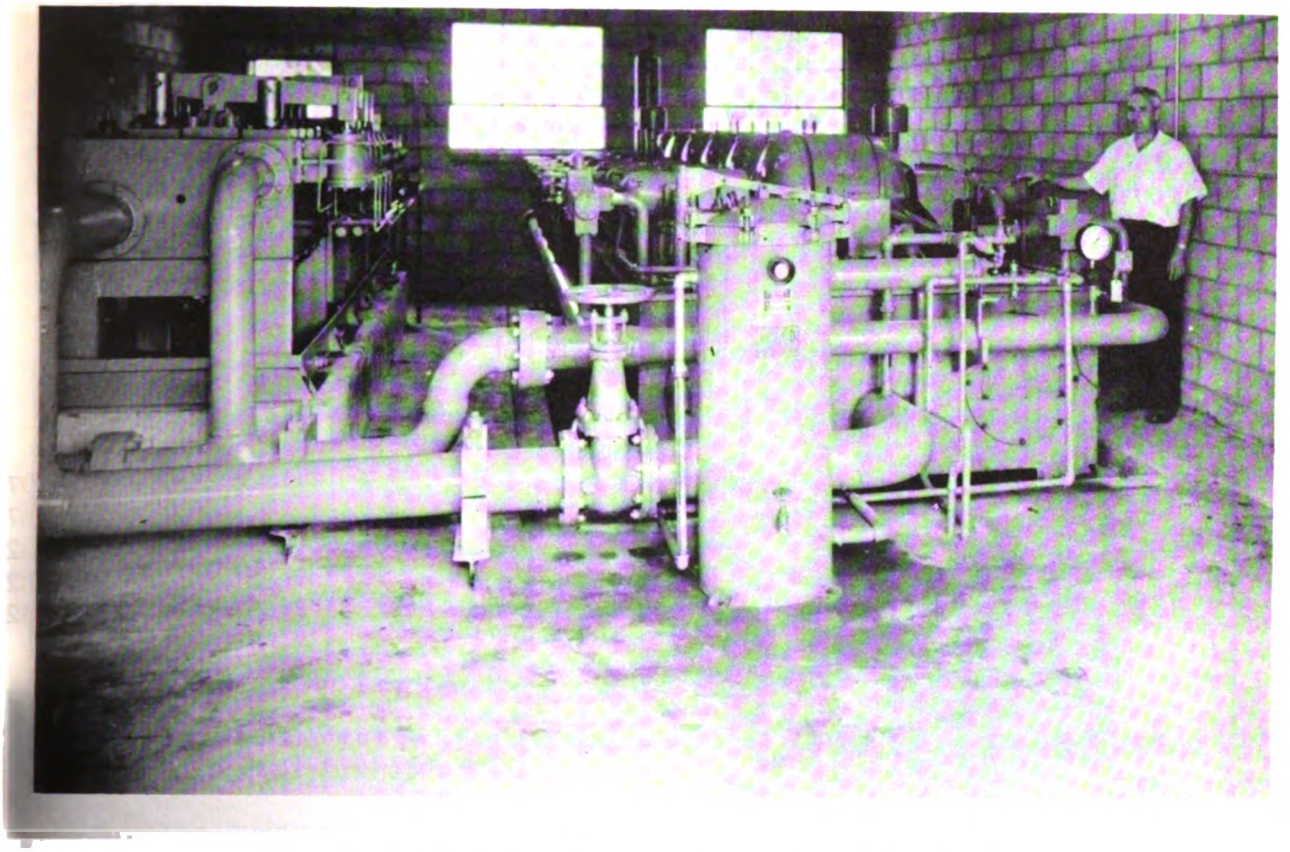

FIGURE 6. - Hydraulic Pressure-Generating Plant of Baler.

The hourly wage scale for the Scrap Iron, Metal, Salvage, and Waste Material Workers Union, Local No. 965, in San Francisco and Local No. 1088, in Oakland, effective September 1, 1958, to September 1, 1959, follows:

Subforeman	$ 2.51	Shear helper	$ 2.135
Switchman, hook tenders, and slingers	2.26	Tin-press operator	2.335
Leaderman burner	2.51	Automotive machine operator	2.26
Burner	2.46	Yard laborer	2.135
Shearman	2.26	Metal sorters and cleaners	2.26

The hourly wage of a crane operator, as specified by the Operating Engineers Union, was $3.365 from September 16, 1958 to September 15, 1959, in San Francisco and Oakland.

MARKETING ORGANIZATION

Dealers and Brokers

Figure 7 shows the county-by-county distribution of dealers in California and Nevada. There were 616 dealers in California and 13 in Nevada in 1958, or

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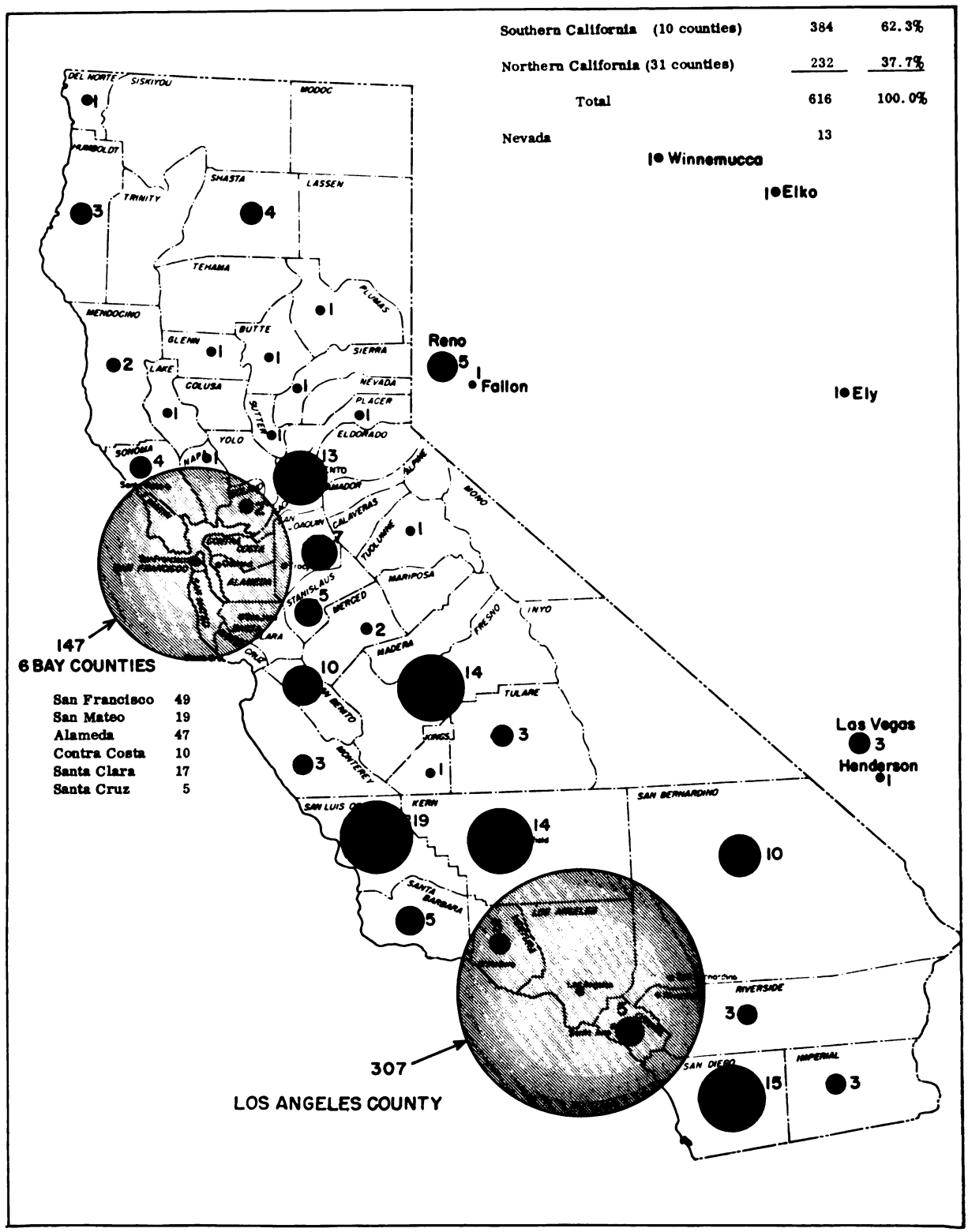

FIGURE 7. - Distribution of Iron and Steel Scrap Dealers in California and Nevada, 1958.

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a total of 629. Of these, 14 in California are classed as large-volume dealers and normally handle over 25,000 tons of scrap per year. Two buyer-consumers are included. Sixteen additional dealers are classed as medium-volume operators, handling approximately 10,000 tons of scrap annually. The California dealers are rather sharply divided geographically into two practically self-sufficient groups: Those in southern California (384), south of the northern boundary of San Luis Obispo, Kern, and San Bernardino Counties, and those in northern California (232), in the rest of the State. Nevada is served principally by Reno and Las Vegas, and all dealers (13) are classed as small.

Southern California

There are eight large-volume operators in southern California (fig. 8):

1. Luria Bros. & Co., Los Angeles (brokers).
2. Hugo Neu Corp., Los Angeles (broker).
3. Berg Pipe & Steel Corp., Los Angeles (dealer-broker).
4. Finkelstein Supply Co., Los Angeles (dealer-broker).
5. National Metal & Steel Corp., Terminal Island, Los Angeles Harbor (dealer-broker).
6. The Purdy Co., Los Angeles (dealer-broker).
7. Alpert & Alpert, Los Angeles (dealer).
8. Lipsett Steel Products, Inc., Los Angeles (dealer).

Five yards are classed as medium-volume:

1. A-1 Iron & Metal Co., Los Angeles.
2. Ace Metal & Waste Co., San Diego.
3. Scrap Disposal, Inc., San Diego.
4. K & D Salvage, Bakersfield.
5. Golden State-Iron & Metal Co., Bakersfield.

The remaining 371 dealers in southern California are classed as small.

Brokers operating in southern California are:

1. Luria Bros. & Co., Los Angeles.
2. Hugo Neu Corp., Los Angeles.

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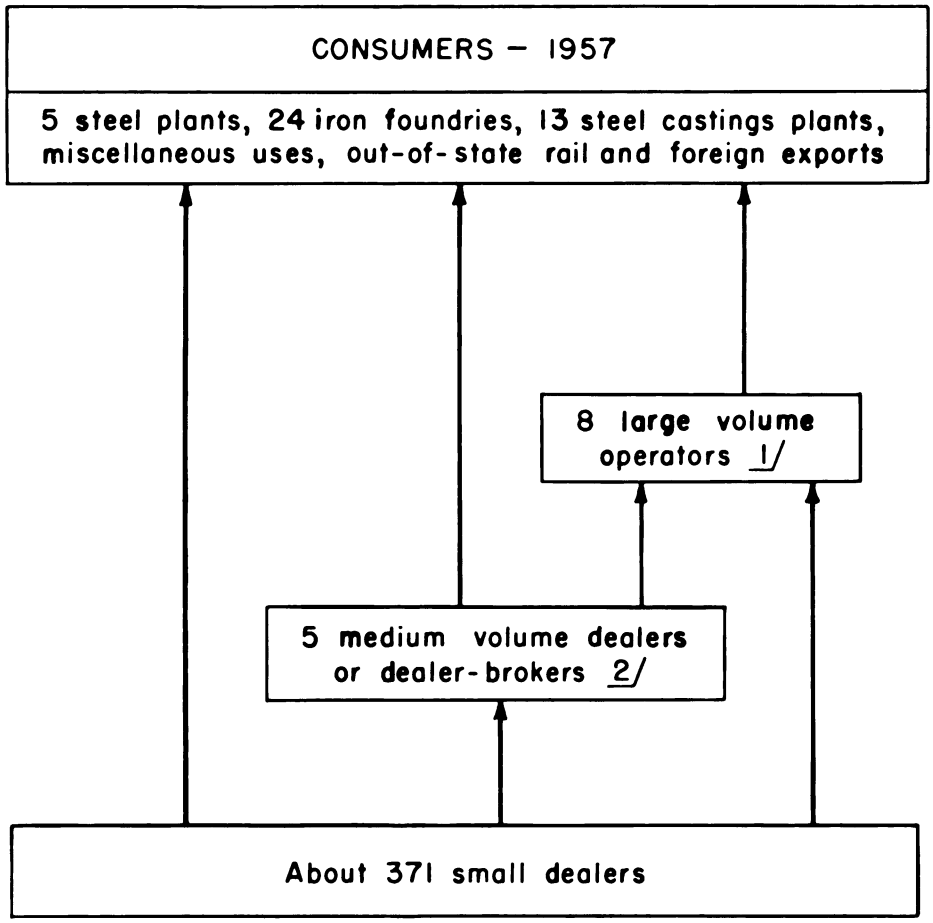
CONSUMERS – 1957
5 steel plants, 24 iron foundries, 13 steel castings plants, miscellaneous uses, out-of-state rail and foreign exports
8 large volume operators 1/
5 medium volume dealers or dealer-brokers 2/
About 371 small dealers

1/ 1. Luria Bros. & Co., Los Angeles (broker)
2. Hugo Neu Corp., Los Angeles (broker)
3. Berg Pipe & Steel Corp., Los Angeles (dealer-broker)
4. Finkelstein Supply Co., Los Angeles (dealer-broker)
5. National Metal & Steel Corp., Terminal Island, Los Angeles Harbor (dealer-broker)
6. The Purdy Co., Los Angeles (dealer-broker)
7. Alpert & Alpert, Los Angeles (dealer)
8. Lipsett Steel Products, Inc., Los Angeles (dealer)

2/ 1. Ace Metal & Waste Co., San Diego
2. Scrap Disposal, Inc., National City
3. K & D Salvage Co., Bakersfield
4. Golden State Iron & Metal Co., Bakersfield
5. A-1 Iron & Metal Co., Los Angeles

FIGURE 8. - Marketing Organization, Southern California, 1958.

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3. Charles Harley Co. of Los Angeles, Los Angeles.

Northern California

There are six large-volume operators in northern California (fig. 9):

1. Luria Bros. & Co., San Francisco (broker).

2. The Learner Co., with main office and yard in Oakland and feeder yards in San Francisco, Sacramento, Stockton, and Pittsburgh (dealer-broker).

3. The Associated Metals Co. of California, with main office and yard in Oakland and feeder yards in Sacramento and San Francisco (dealer-broker).

4. The Purdy Co., South San Francisco, with a feeder yard at Ewing, Placer County, Calif. (dealer-broker).

5. Judson Steel Corporation, Emeryville (buyer).

6. Pacific States Steel Corporation, Niles (buyer).

Eleven yards are classed as medium-volume:

1. Circosta Iron & Metal Co., San Francisco.

2. Mayco Salvage Co., San Francisco.

3. Essee Iron & Metal Co., Oakland.

4. Markovits & Fox, San Jose.

5. Bay Shore Scrap Iron Co., San Jose.

6. Levin Machinery & Salvage Co., San Jose.

7. M. Davidson, Stockton.

8. California Salvage & Machinery Co., Watsonville.

9. Levi's Iron & Metal Co., Fresno.

10. Heppner Iron & Metal Co., Fresno.

11. Fresno Junk Co., Fresno.

The remaining 215 dealers in northern California are classed as small.

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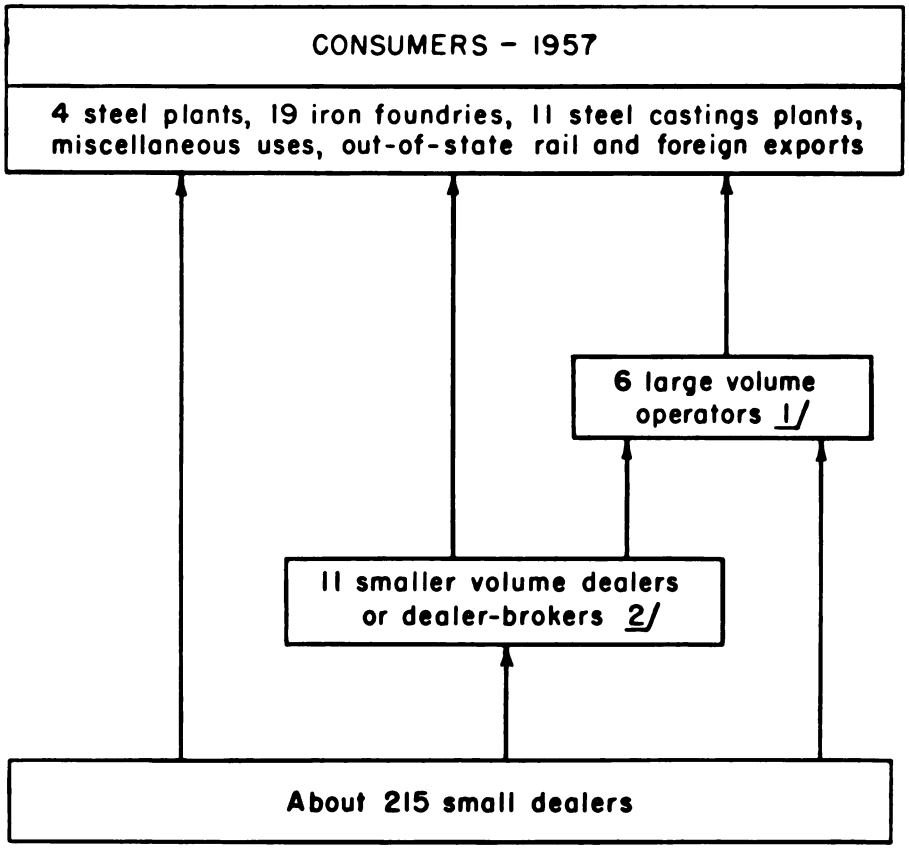
CONSUMERS - 1957
4 steel plants, 19 iron foundries, 11 steel castings plants, miscellaneous uses, out-of-state rail and foreign exports
6 large volume operators 1/
11 smaller volume dealers or dealer-brokers 2/
About 215 small dealers

1/ 1. Luria Bros. & Co., San Francisco (broker)
2. The Learner Co., Oakland, Sacramento, Stockton, and Pittsburg (dealer-broker)
3. Associated Metals Co. of California, Oakland, Sacramento, and San Francisco (dealer-broker)
4. The Purdy Co., South San Francisco and Ewing (dealer-broker)
5. Judson Steel Corp., Emeryville (buyer-consumer)
6. Pacific States Steel Corp., Niles (buyer-consumer)

2/ 1. Markovits & Fox, San Jose
2. M. Davidson, Stockton
3. Levi's Iron & Metal Co., Fresno
4. Circosta Iron & Metal Co., San Francisco
5. Mayco Salvage Co., San Francisco
6. Essee Iron & Metal Co., Oakland
7. Bay Shore Scrap Iron Co., San Jose
8. Levin Machinery & Salvage Co., San Jose
9. California Salvage & Machinery Co., Watsonville
10. Heppner Iron & Metal Co., Fresno
11. Fresno Junk Co., Fresno

FIGURE 9. - Marketing Organization, Northern California, 1958.

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Brokers operating in northern California are:

1. Luria Bros. & Co., San Francisco (broker).

2. The Learner Co., Oakland (dealer-broker).

3. Associated Metals Co. of California, Oakland (dealer-broker).

4. The Purdy Co., South San Francisco (dealer-broker).

Trade Associations

The Institute of Scrap Iron and Steel is the principal national dealer's and broker's trade association with headquarters at 1729 H Street, N.W., Washington 6, D.C. It was incorporated in 1928 and had a stated membership in 1957 of 1,301 from 45 States. In addition to news releases for members, the Institute publishes a yearbook containing a review of the year's activities in the iron and steel scrap industry with statistical and scrap specification data. Included are lists of officers, directors and staff, and chapter and national committee personnel. Of special interest are the personnel lists of southern California and northern California chapters. Membership of the several Institute committees is listed.

The National Federation of Independent Scrap Yard Dealers, 29 Broadway, New York, N.Y., is a trade association with a claimed membership in 1957 of 200.

Two car-wrecking trade associations are active in California: Auto Wrecker's Association of Southern California, with offices in Los Angeles, and Northern California Auto Wrecker's Association, with offices in San Leandro. The southern association publishes a monthly list of car parts for sale by members by make and year model of car entitled "Auto Parts Reporter of Southern California." The northern association publishes a similar monthly list entitled "Parts Locator."

DEMAND AND SUPPLY OF IRON AND STEEL SCRAP

Tonnage figures developed in this chapter show the demand and supply of iron and steel scrap in California and Nevada in 1957. Demand is estimated in terms of the requirements of the consuming industries, of those who ship scrap by rail out of California and Nevada, and of exporters of scrap for foreign consumption. Supply is estimated in terms of home scrap and purchased scrap. Purchased scrap is further broken down into prompt industrial and obsolete scrap.

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Demand

Number of Scrap-Consuming Plants

The number of active iron and steel scrap-consuming plants in California and Nevada in 1957 was as follows:

	Los Angeles area	San Bernardino County	San Francisco area	Other	Total
Steel-ingot producers...	4	1	4	0	9
Gray-iron foundries.....	25	0	19	1/1	45
Steel foundries.....	11	2	9	2/3	25
Other.....	0	0	0	3/1	1
Total.....	40	3	32	5	80

1/ Redding.
2/ Grass Valley, Altaville, and McGill, Nev.
3/ Yerington, Nev.

Scrap-Consuming Industries

Production or shipments of iron and steel by scrap-consuming industries[4] in California in 1956 and 1957 was as follows:

	1956	1957
Steel-ingot production[1]/.....gross tons..	2,841,782	2,772,052
Iron foundries, castings (shipments).....do.....	402,287	360,177
Steel foundries, castings (shipments).....do.....	58,341	60,954
Total.....	3,302,410	3,193,183

1/ Includes steel castings made by ingot producers.

Capacity of Scrap-Consuming Steel Mills

Table 1 shows the annual capacity of steel mills in California that were active in 1960 in net tons of ingots and steel for castings.

TABLE 1. - Capacity of steel mills in California, 1960, in net tons

	Annual capacity	Percent
Los Angeles area:		
1. Bethlehem Pacific Coast Steel Corp., Vernon Bethlehem Steel Corp., 3 electric furnaces.....	478,000	
2. Southwest Steel Rolling Mills, Los Angeles, 2 electric furnaces.....	100,000	
3. Columbia-Geneva Steel Division, Torrance, U.S. Steel Corp., 4 open-hearth furnaces.....	237,000	
4. National Supply Co., Torrance, Armco Steel Corp., 3 electric furnaces.....	50,000	

4/ Bureau of the Census, Facts For Industry: Iron and Steel Foundries and Ingot Producers 1957.

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TABLE 1. - Capacity of steel mills in California, 1960, in net tons (Con.)

	Annual capacity	Percent
5. Soulé Steel Co., Los Angeles, 1 electric furnace..	36,000	
Subtotal.....	901,000	18.6
San Francisco area:		
1. Judson Steel Corp., Emeryville, 3 open-hearth furnaces.....	76,500	
2. Pacific States Steel Corp., Niles, 4 open-hearth furnaces.....	265,000	
3. Bethlehem Pacific Coast Steel Corp., South San Francisco, Bethlehem Steel Corp., 5 open-hearth furnaces.....	276,000	
4. Columbia-Geneva Steel Division, U.S. Steel Corp., 5 open-hearth furnaces.....	380,000	
Subtotal.....	997,500	20.5
San Bernardino County:		
1. Kaiser Steel Corp., Fontana, 4 blast furnaces, 9 open-hearth furances, 3 oxygen converters.....	2,933,000	60.4
2. Etiwanda Steel Products, Inc., Etiwanda, American Pipe & Construction Co., 1 electric furnace.....	25,000	
Subtotal.....	2,958,000	60.9
Total[1].....	4,856,500	100.0

1/ 4 blast, 30 open-hearth, and 10 electric furnaces and 3 oxygen converters.

The locations of the above mills and their capacities are shown graphically in figure 10.

Consumption of Iron and Steel Scrap

Consumer Requirements

Home and purchased iron and steel scrap, consumed for all purposes in California and Nevada in 1956 and 1957[5], was as follows:

Consumers	1956	1957	1957, percent
Steel-ingot producers.....gross tons..	1,985,668	1,914,934	79.3
Iron foundries.....do.....	374,865	319,031	13.2
Steel foundries.....do.....	135,020	142,867	5.9
Other[1].....do.....	43,255	37,918	1.6
Total.....	2,538,808	2,414,750	100.0

1/ Partly estimated by author.

5/ Bureau of Mines figures.

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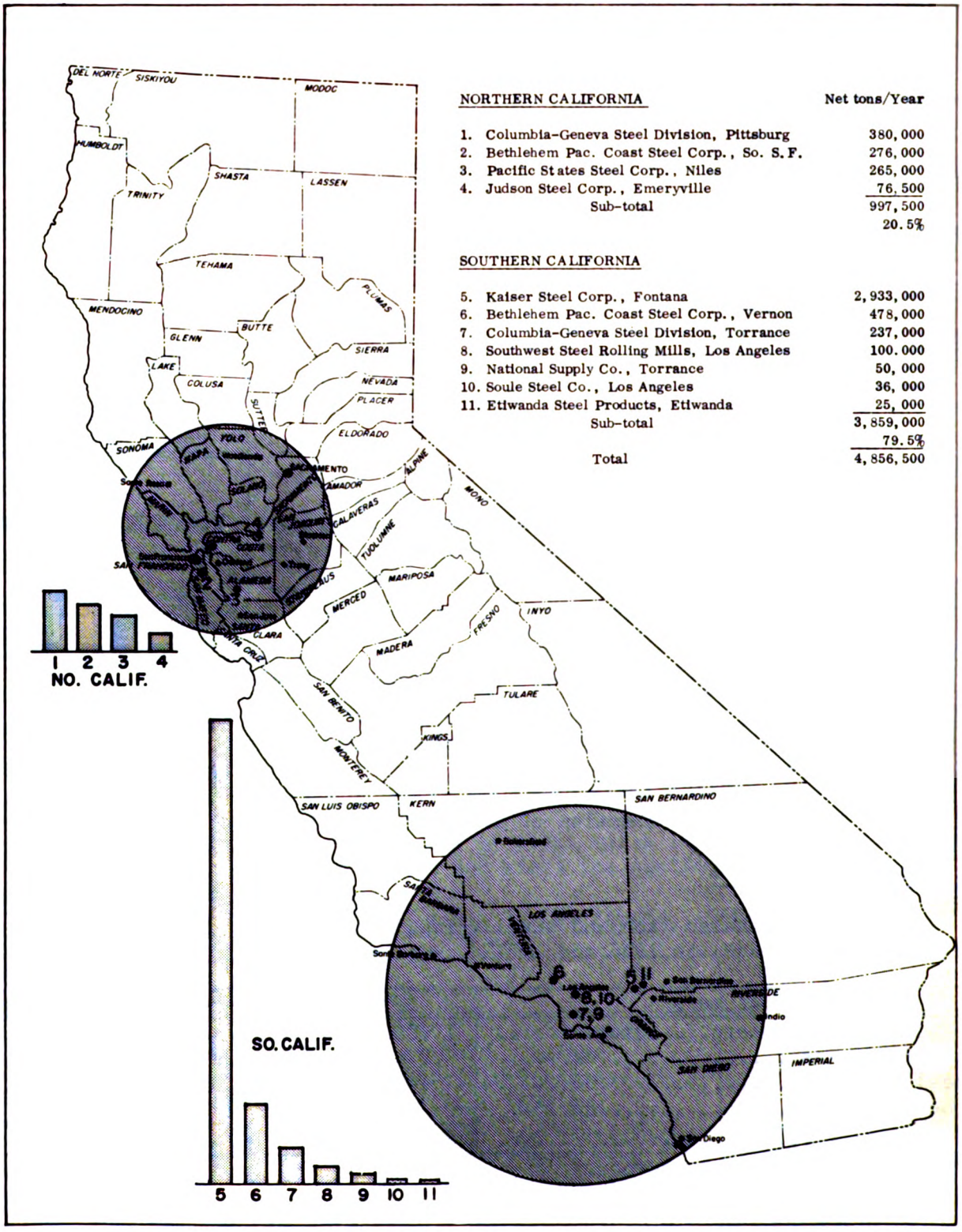

FIGURE 10. - Capacities of Steel Mills in California, 1958.

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Consumption by Types of Operations

Table 2 shows a breakdown of iron and steel scrap consumption by types of furnace or operation in California and Nevada in 1957:

TABLE 2. - Home and purchased iron and steel scrap consumed by industrial operations in California and Nevada, 1957, in gross tons

Consumers		Percent of total
Steel mills:		
Open-hearth furnaces	1,395,415	
Electric furnaces	494,865	
Blast furnaces	4,266	
Rerolling operations	19,818	
Miscellaneous operations	570	
Subtotal	1,914,394	79.3
Iron foundries and miscellaneous users:		
Cupola furnaces	289,952	
Electric furnaces	4,280	
Air furnaces	10,907	
Rerolling operations	7,424	
Other operations	6,468	
Subtotal	319,031	13.2
Steel castings plants:		
Cupola furnaces	15,294	
Electric furnaces	127,573	
Subtotal	142,867	5.9
Other plants:	37,918	1.6
Total	2,414,750	100.0

Consumption by Products and Areas

Table 3 gives the consumption of scrap by geographical distribution in California and Nevada in 1957.

Table 4 shows the grade breakdown of the totals in table 3.

Table 5 shows the iron and steel scrap reported by consumers as received in 1957. This table gives purchased scrap and differs from table 4 in that it does not include home scrap. The sum of received and home scrap (p. 32) approximates the consumption totals in table 4. Exact equality is not to be expected because both home and purchased scrap may go into inventory instead of being consumed. The received scrap figures are shown graphically in figures 11 and 12.

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TABLE 3. - Consumption of iron and steel scrap in California and Nevada by geographical distribution, 1957, in gross tons

Consumers	Southern 1/ California	Per-cent	Northern 2/ California	Per-cent	Nevada	Per-cent	Total	Per-cent
Steel-ingot producers....	1,179,640	61.6	735,294	38.4	0		1,914,934	100.0
Iron foundries...	159,182	49.9	159,849	50.1			319,031	100.0
Steel foundries...	100,379	70.3	37,279	26.1	3/43,127	100.0	3/180,785	100.0
Other....	0		0					
Total..	1,439,201	59.6	932,422	38.6	43,127	1.8	2,414,750	100.0

1/ Includes Kern, Los Angeles, Orange, San Bernardino, San Diego, and Ventura Counties.

2/ Includes Alameda, Calaveras, Contra Costa, Fresno, Nevada, Sacramento, San Francisco, San Joaquin, San Mateo, and Shasta Counties.

3/ Partly estimated by author.

The most significant difference between the received scrap pattern of southern and northern California is the difference between the ratios of the No. 1 Heavy Melting and No. 2 Heavy Melting grades to total receipts as follows:

	No. 1 Heavy Melting, percent	No. 2 Heavy Melting, percent
Southern California.....	26.3	13.6
Northern California.....	11.4	28.0

This difference is assumed to be due to the greater availability and price advantage of No. 1 bundles of prompt industrial scrap in northern California and the use of this grade instead of the No. 1 Heavy Melting scrap as a cost-saving procedure.

Domestic Rail Exports

Table 6 gives the estimated rail exports from California to other States in 1956 and 1957.

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TABLE 4. - Iron and steel scrap consumption by grade in California and Nevada, 1957, in gross tons

Grade	Southern California[1]		Northern California[2]		Nevada		Total	
	Gross tons	Percent	Gross tons	Percent	Gross tons	Percent	Gross tons	Percent
No. 1 Heavy Melting.....	633,937	71.8	248,631	28.2	-	-	882.568	100.0
No. 2 Heavy Melting.....	140,979	43.0	186,879	57.0	-	-	327,858	100.0
Bundles.....	232,510	57.9	169,354	42.1	-	-	401,864	100.0
Low phosphorous.....	60,775	67.0	29,933	33.0	-	-	90,708	100.0
Cast iron, other than borings.....	156,800	46.6	176,875	52.6	2,718	0.8	336,393	100.0
Turnings or borings (alloy free).....	30,683	67.0	15,113	33.0	-	-	45,796	100.0
Rerolling rails.....	19,069	70.0	8,173	30.0	-	-	27,242	100.0
Rails.....	5,608	40.0	8,411	60.0	-	-	14,019	100.0
High-speed steel.....	-	-	-	-	-	-	-	-
Stainless steel.....	528	40.0	792	60.0	-	-	1,320	100.0
All other alloy iron and steel.....	10,543	76.0	3,330	24.0	-	-	13,873	100.0
All other prepared.....	128,628	73.6	8,210	4.7	3/37,918	21.7	174,756	100.0
Unprepared.....	19,141	19.5	76,721	78.0	2,491	2.5	98,353	100.0
Total.....	1,439,201	59.6	932,422	38.6	43,127	1.8	2,414,750	100.0

1/ Includes Los Angeles, Orange, Ventura, San Diego, San Bernardino, and Kern Counties.
2/ Includes Alameda, Calaveras, Contra Costa, Fresno, Nevada, Sacramento, San Francisco, San Joaquin, San Mateo, and Shasta Counties.
3/ Estimated by author.

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TABLE 5. - New scrap received by consumers in 1957 in California and Nevada, by grade

Grades of scrap	Southern California		Northern California		Nevada		Total	
	Gross tons	Percent	Gross tons	Percent	Gross tons	Percent	Gross tons	Percent
No. 1 Heavy Melting steel	205,652	74.7	69,650	25.3	-	-	275,302	100.0
No. 2 Heavy Melting steel	106,577	38.3	171,590	61.7	-	-	278,167	100.0
Bundles	216,718	58.0	156,706	42.0	-	-	373,424	100.0
Low phosphorous	42,081	74.0	14,771	26.0	-	-	56,852	100.0
Cast iron, other than borings	130,426	56.6	99,353	43.1	654	0.3	230,433	100.0
Turnings and/or borings (alloy free)	27,449	58.8	19,233	41.2	-	-	46,682	100.0
Rerolling rails	15,892	70.3	6,681	29.6	26	.1	22,599	100.0
Rails	6,592	44.2	8,308	55.8	-	-	14,900	100.0
High-speed steel	-	-	-	-	-	-	-	-
Stainless steel	42	100.0	-	-	-	-	42	100.0
All other alloy iron and steel	1,610	57.2	1,207	42.8	-	-	2,817	100.0
All other prepared	22,233	33.7	5,620	8.5	1/38,125	57.8	65,978	100.0
Unprepared scrap	7,246	10.5	59,129	85.8	2,514	3.7	68,889	100.0
Total	782,518	54.5	612,248	42.6	41,319	2.9	1,436,085	100.0

1/ Partly estimated by author.

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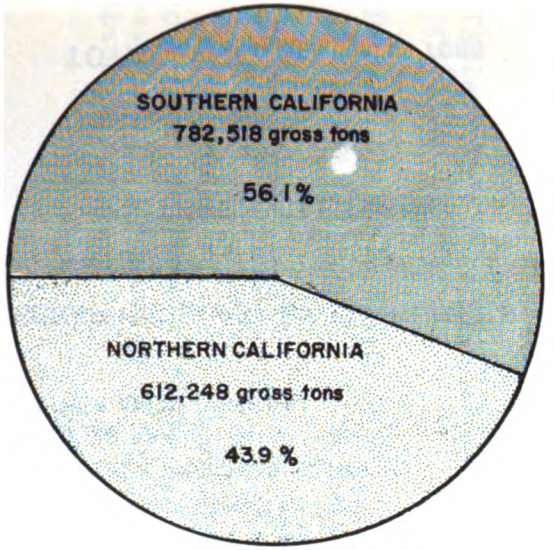
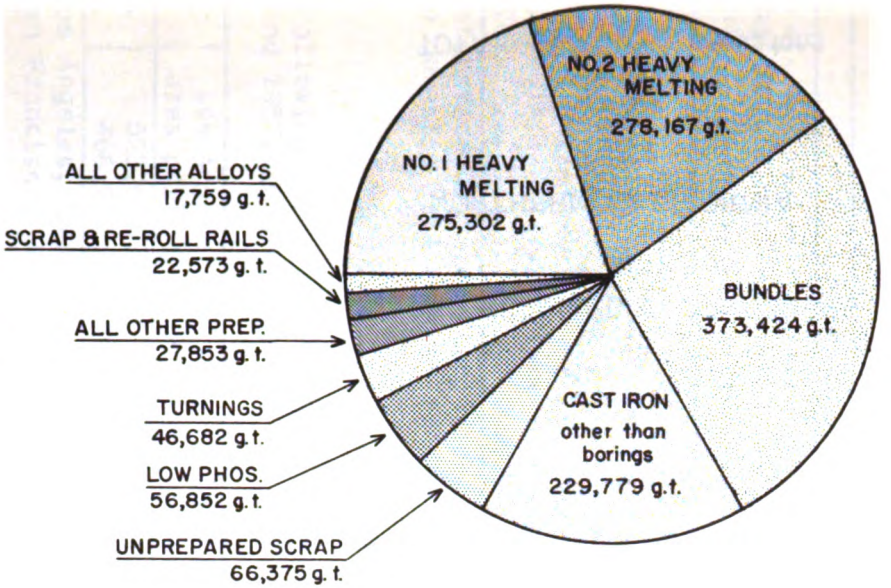


Total 1,394,776 gross tons

NEW SCRAP RECEIVED
BY
CALIFORNIA CONSUMERS
1957



NEW SCRAP RECEIVED
BY
CALIFORNIA CONSUMERS
1957
BY GRADES

FIGURE 11. - New Scrap Received by California Consumers, 1957.

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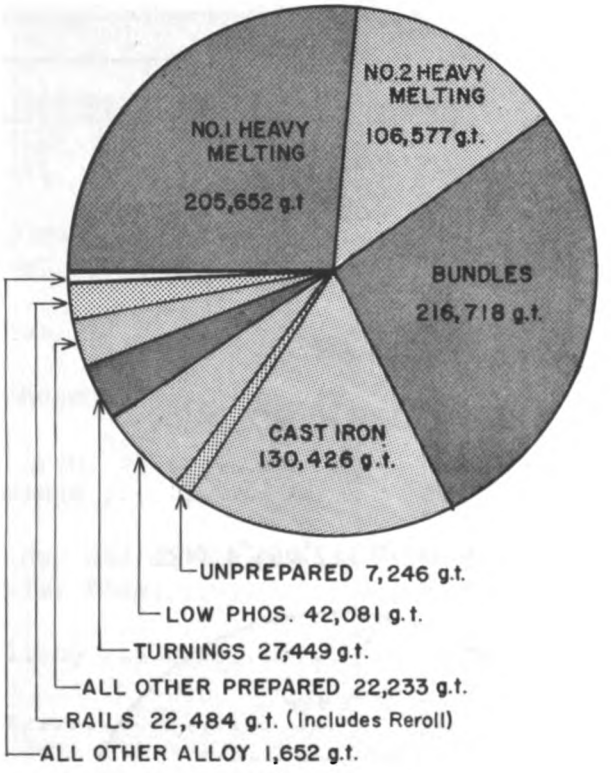
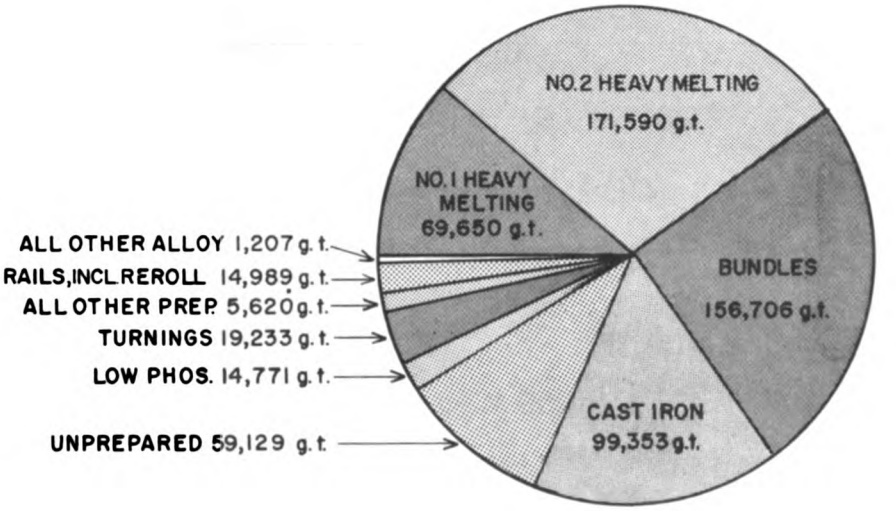


SCRAP RECEIVED BY CONSUMERS
IN
SOUTHERN CALIFORNIA
1957
56.1%
TOTAL - 782,518 gross tons



SCRAP RECEIVED BY CONSUMERS
IN
NORTHERN CALIFORNIA
1957
43.9%
TOTAL - 612,248 gross tons

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TABLE 6. - Rail exports[1] of iron and steel scrap from California,[2] 1956 and 1957, in gross tons

Destination	1956	1957
Utah	59,700	63,000
Washington	11,000	
Arizona	34,300	44,200
Texas	10,000	
New Mexico	15,700	5,000
Connecticut		3,100
New York	4,100	
Maryland		2,700
Pennsylvania	3,300	
Total	138,100	118,000

1/ Interstate Commerce Commission, Carload Waybill Statistics, 1956, 1957.
2/ No domestic rail exports from Nevada are reported for 1956 and 1957.

Foreign Exports

Following are exports[6] to foreign countries from California ports in 1956 and 1957, in gross tons:

Year	Los Angeles area ports 1/	Percent	San Francisco area ports 2/	Percent	Total	Percent
1956..	523,094	68.7	238,187	31.3	761,281	100.0
1957..	466,272	57.6	343,049	42.4	809,321	100.0

1/ Los Angeles, Long Beach, and San Diego.
2/ San Francisco, Oakland, Richmond, and San Joaquin River ports.

Total Scrap Consumed and Exported

Table 7 is a recapitulation of the 1957 consumption and export data for California and Nevada.

Figures in table 7 are shown graphically by counties and groups of counties in figure 13.

Supply

The following analysis of the 1957 sources of supply accounts for the demand figure developed in table 7. Supply is estimated in terms of home and purchased scrap. Purchased scrap is further broken down into prompt industrial and obsolete scrap.

6/ Corps of Engineers, Waterborne Commerce of the United States. Part 4. 1956, 1957.

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TABLE 7. - Total scrap consumed and exported, 1957, in gross tons

	Southern California	Percent	Northern California	Percent	Nevada	Total	Percent
	CONSUMPTION						
Steel-ingot producers...	1,179,640	82.0	735,294	78.9	0	1,914,934	79.3
Iron foundries.....	159,182	11.1	159,849	17.1	0	319,031	13.2
Steel foundries.....	100,379	6.9	37,279	4.0	43,127	180,785	7.5
Other.....	0	-	0	-			
Total....	1,439,201	100.0	932,422	100.0	43,127	2,414,750	100.0
Percent.....	59.6		38.6		1.8	100.0	
	FOREIGN EXPORT						
Total....	466,272		343,049		0	809,321	
Percent.....	57.6		42.4			100.0	
	RAIL EXPORTS 1/						
Total....	70,800		47,200		0	118,000	
Percent.....	60.0		40.0			100.0	
	TOTAL SCRAP						
Grand total..	1,976,273		1,322,671		43,127	3,342,071	
Percent.....	59.1		39.6		1.3	100.0	

1/ Distribution made on the basis of approximate relative scrap consumption.

Home Scrap

Generated home scrap in California and Nevada in 1956 and 1957, compiled from the monthly canvasses of scrap consumers conducted by the Bureau of Mines are as follows:

	Gross tons		Percent, 1957
	1956	1957	
Steel-ingot producers.....	870,540	821,486	83.6
Iron foundries.....	111,739	95,709	9.8
Steel foundries.....	63,733	65,254	6.6
Total.....	1,046,012	982,449	100.0

Purchased Scrap

Prompt Industrial Scrap

The number of firms generating prompt industrial scrap in California and Nevada is estimated at about 1,900. The U.S. Bureau of the Census completed a nationwide survey 7/ of such industries employing 250 persons or more in 1954 and estimated California production for 1954 at 130,000 net tons. No industrial scrap generation in Nevada was recorded for that year, and it is assumed

7/ U.S. Department of Commerce, Industrial Scrap Generation: 1957.

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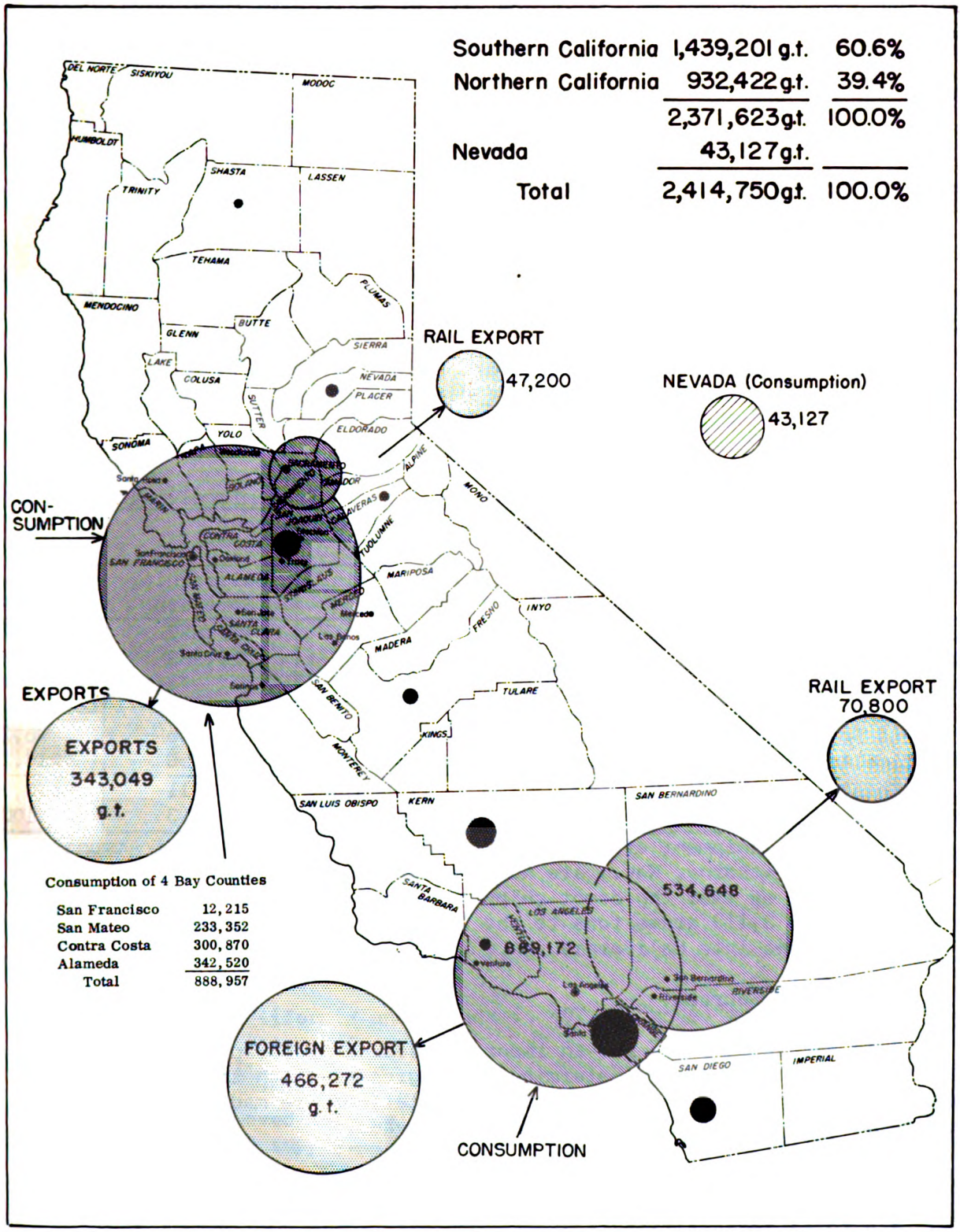

FIGURE 13. - Consumption and Export of Iron and Steel Scrap, California and Nevada, 1957.

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that none was generated in 1957. The list of California industrial producers is not obtainable. However, the ratio of estimated industrial scrap produced to total receipts of new scrap, in gross tons, in California in 1954 is:

$$\frac{130,000}{2,185,451} = .059.$$

If this factor is applied to the 1957 consumption of scrap in California, the following tonnage of prompt industrial scrap generated is estimated:

$$0.059 \times 2,371,623 = 140,000 \text{ long tons.}$$

Obsolete Scrap

Sales of obsolete scrap in 1957 are estimated for (1) miscellaneous sources, (2) automotive sources, and (3) domestic rail imports.

(1) Miscellaneous Sources

TABLE 8. - Obsolete iron and steel scrap from miscellaneous sources, 1957, in gross tons

	California, Southern	California, Northern	Total
Army	335	17,837	18,172
Navy and Marine Corps	15,109	29,268	1/44,377
Railroads (Southern Pacific, Union Pacific, Western Pacific, and Santa Fe)	61,924	34,356	96,280
Maritime Administration	-	14,250	14,250
Total	77,368	95,711	173,079
Percent	44.7	55.3	100.0

1/ Figures for shipment of iron and steel scrap from U.S. Naval Ammunition Depot, Hawthorne, Nev., are not available for 1957. During the first 6 months of 1959 the depot shipped 2,067 gross tons to the San Francisco area and 3,119 gross tons to the Los Angeles area, a total of 5,186 gross tons into California.

(2) Automotive Sources

Scrapped automobiles are an important source of scrap iron and steel in California and Nevada. To determine the degree to which they contributed obsolete scrap in 1957, the following computations are made for passenger cars and commercial vehicles in California and Nevada.

Let,

A = total registration in 1956,

B = total registration in 1957,

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C = cars not registered again in 1957,

D = old cars registered again in 1957, and

E = new cars registered in 1957.

Then, $C = A - D$

and $D = B - E.$

Hence, $C = A - (B - E).$

As A, B, and E are available, the following equation results for California:

$$C = \underset{(A)}{6,452,491} - (\underset{(B)}{6,745,873} - \underset{(E)}{649,718}) = 356,336 \text{ cars not registered again in 1957.}$$

The figures for Nevada are:

$$C = \underset{(A)}{140,537} - (\underset{(B)}{147,311} - \underset{(E)}{13,802}) = 7,028 \text{ cars not registered again in 1957.}$$

It is further assumed that these cars moved into car-wrecking yards in 1957, thereby causing approximately the same number of cars to move from these yards to scrap dealers' yards during the year. This movement is assumed to be due to the short-term physical limitations of the yards and the short-term financial limitation of the dealers. If the average ferrous scrap recovery per car is 2,515 pounds,[8] then the automotive tonnage that went into scrap in California in 1957 was

$$\frac{356,336 \times 2,515}{2,240} = 400,083 \text{ gross tons,}$$

and in Nevada,

$$\frac{7,028 \times 2,515}{2,240} = 7,891 \text{ gross tons.}$$

The total for California and Nevada is 407,974 gross tons.

(3) Domestic Rail Imports

As some scrap moved into California by rail, this tonnage accounts for part of the available supply. The 1956 and 1957 estimates[9] for movements

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8/ Institute of Scrap Iron and Steel, Inc., estimate of Oct. 1, 1956. (This figure does not take into consideration the weight of the parts removed for sale.)

9/ Interstate Commerce Commission, Carload Waybill Statistics 1956, 1957.

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into California are shown in table 9. No rail imports into Nevada are recorded. However, Anaconda Co., Yerington, Nev., imports by rail shredded tin-can scrap and detinned industrial scrap, principally from California (Los Angeles, Bakersfield, and South San Francisco); a small tonnage comes from Houston, Texas. This scrap is used for copper replacement from a copper sulfate solution (fig. 14).

TABLE 9. - Rail movement of iron and steel scrap into California, in gross tons

Origin	1956	1957
Arizona	60,900	46,100
New Mexico	5,700	5,200
Oregon	11,800	13,700
Utah	5,400	5,400
Washington	4,100	21,600
Total	87,900	92,000

Total Scrap Supply

To recapitulate, the total scrap supply so far estimated for 1957 is:

	Gross tons	Percent
1. Home scrap	982,449	54.7
2. Purchased scrap		
Prompt industrial scrap	140,000	7.8
Obsolete scrap, miscellaneous sources	173,079	32.4
Obsolete scrap, automotive	407,974	
Unclassified purchased scrap, rail imports	92,000	5.1
Total	1,795,502	100.0

If the supply figure so far accounted for is subtracted from the total required supply of 3,342,071 gross tons, the following balance is obtained:

	Gross tons
Estimated demand	3,342,071
Supply so far estimated	1,795,502
	1,546,569

The balance of 1,546,569 gross tons represents the estimated tonnage of purchased obsolete scrap supplied by dealers in California and Nevada in 1957 from their collections and inventories. It is made up of two elements: (1) Scrap in dealer inventory purchased before 1957 but sold in 1957, and (2) scrap in dealer inventory purchased and sold in 1957. The first item may include all sources of obsolete scrap and prompt industrial scrap. The second item would not include prompt industrial, automotive, or miscellaneous obsolete scrap (as has been listed) or rail imports, as these are separately accounted for in the 1957 analysis of supply.

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FIGURE 14. - Shredded Tin-Can Scrap Stockpile, Anaconda Co., Yerington, Nev.

The demand and supply relationships so far developed are shown graphically in figure 15.

EXPORTS

Annual exports to foreign countries from ports in the Los Angeles and San Francisco area for 1935-58 are shown in table 10. Figure 16 shows the same data graphically.

Exports are usually shipped as 10,000- to 12,-500-ton cargoes. Scrap is loaded by cranes with magnets at a rate of about 1,000 tons per day. Loading is usually done directly from open-rail gondola to ship by crane and magnet. The grades of scrap depend on the export agreement. Some shipments are 40-percent No. 1 Heavy Melting, 40-percent No. 2 Heavy Melting, and 20-percent Bundles. Other shipments may be one-third each of these grades or 90 percent No. 2 and about 10 percent cast motor blocks. A large percentage of the scrap is usually automotive. The scrap shipped from the San Francisco area is loaded at the Parr-Richmond Terminal in Richmond (fig. 17), the Howard Terminal in Oakland, and Pier 92 in San Francisco.

Shipments from the Los Angeles area are loaded at Los Angeles Harbor and at Terminal Island, Long Beach.

Exports[10/] through the San Francisco customs district in 1956 and 1957, in gross tons, were shipped to the following countries:

	1956	Percent	1957	Percent
Japan	160,978	86.1	209,176	74.9
Taiwan	26,086	13.9	28,666	10.3
France	-	-	15,203	5.4
West Germany	-	-	14,643	5.2
Italy	-	-	10,587	3.8
Mexico	-	-	648	.3
India	-	-	260	.1
Total	187,064	100.0	279,183	100.0

10/ Foreign Trade through San Francisco Customs District, 1956, 1957, Port of San Francisco.

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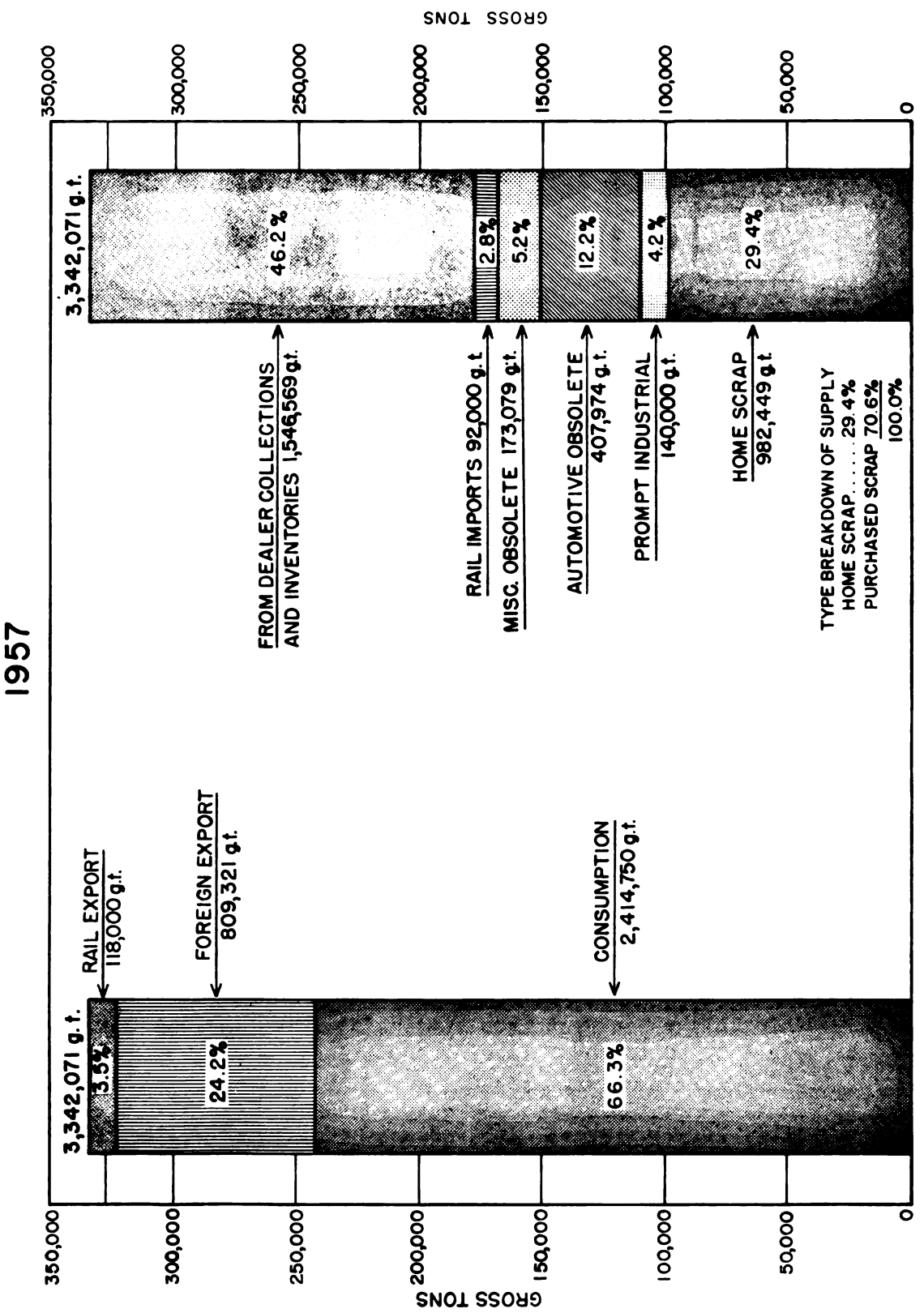

FIGURE 15. - Relation of Demand and Supply of Iron and Steel Scrap in California and Nevada, 1957.

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TABLE 10. - Exports of iron and steel scrap from California ports, 1935-57, in gross tons

Year	Los Angeles area				San Francisco area					Total (all harbors)
	Los Angeles Harbor	Long Beach Harbor	San Diego Harbor	Total (Los Angeles area)	Richmond Harbor	Oakland Harbor	San Francisco Harbor	San Joaquin River (including Stockton)	Total (San Francisco area)	
1935.....	27,809	72,696	5,271	105,776	0	24,363	15,125	4,246	43,734	149,510
1936.....	13,423	56,659	4,317	74,399	0	40,068	16,469	3,119	59,656	134,055
1937.....	25,605	34,503	3,030	63,138	0	31,892	16,908	830	49,630	112,768
1938.....	41,536	65,314	2,483	109,333	229	23,905	20,591	0	44,725	154,058
1939.....	90,959	67,369	4,083	162,411	0	0	31,929	0	31,929	194,340
1940.....	88,580	96,539	5,515	190,634	0	14,764	59,208	0	73,972	264,606
1941.....	82,454	32,764	0	115,218	0	2,738	27,179	0	29,917	145,135
1942.....	363	0	0	363	0	0	1,920	0	1,920	2,283
1943.....	681	0	0	681	121	0	8,908	0	9,029	9,710
1944-47.....	0	0	0	0	0	0	0	0	0	0
1948.....	8	0	0	8	0	53	6,988	0	7,041	7,049
1949.....	0	153	0	153	0	137	1,577	45	1,759	1,912
1950.....	485	0	0	485	0	0	201	0	201	686
1951.....	290	405	0	695	0	271	1,003	0	1,274	1,969
1952.....	934	296	0	1,230	0	29	534	0	563	1,793
1953.....	0	19	0	19	0	0	11	0	11	30
1954.....	105,699	4,246	0	109,945	0	97,898	10,012	0	107,910	217,855
1955.....	167,230	47,688	16,946	231,864	59,807	151,971	3,734	0	215,512	447,376
1956.....	314,207	195,408	13,479	523,094	94,592	140,279	3,315	0	238,186	761,280
1957.....	370,408	95,864	0	466,272	177,387	162,791	2,871	0	343,049	809,321
1958.....	146,908	60,279	0	207,187	73,224	85,260	3,738	0	162,222	369,409

Source: Department of the Army, Corps of Engineers "Waterborne Commerce of the United States, Part 4 - Waterways and Harbors: Pacific Coast, Alaska and Pacific Islands."

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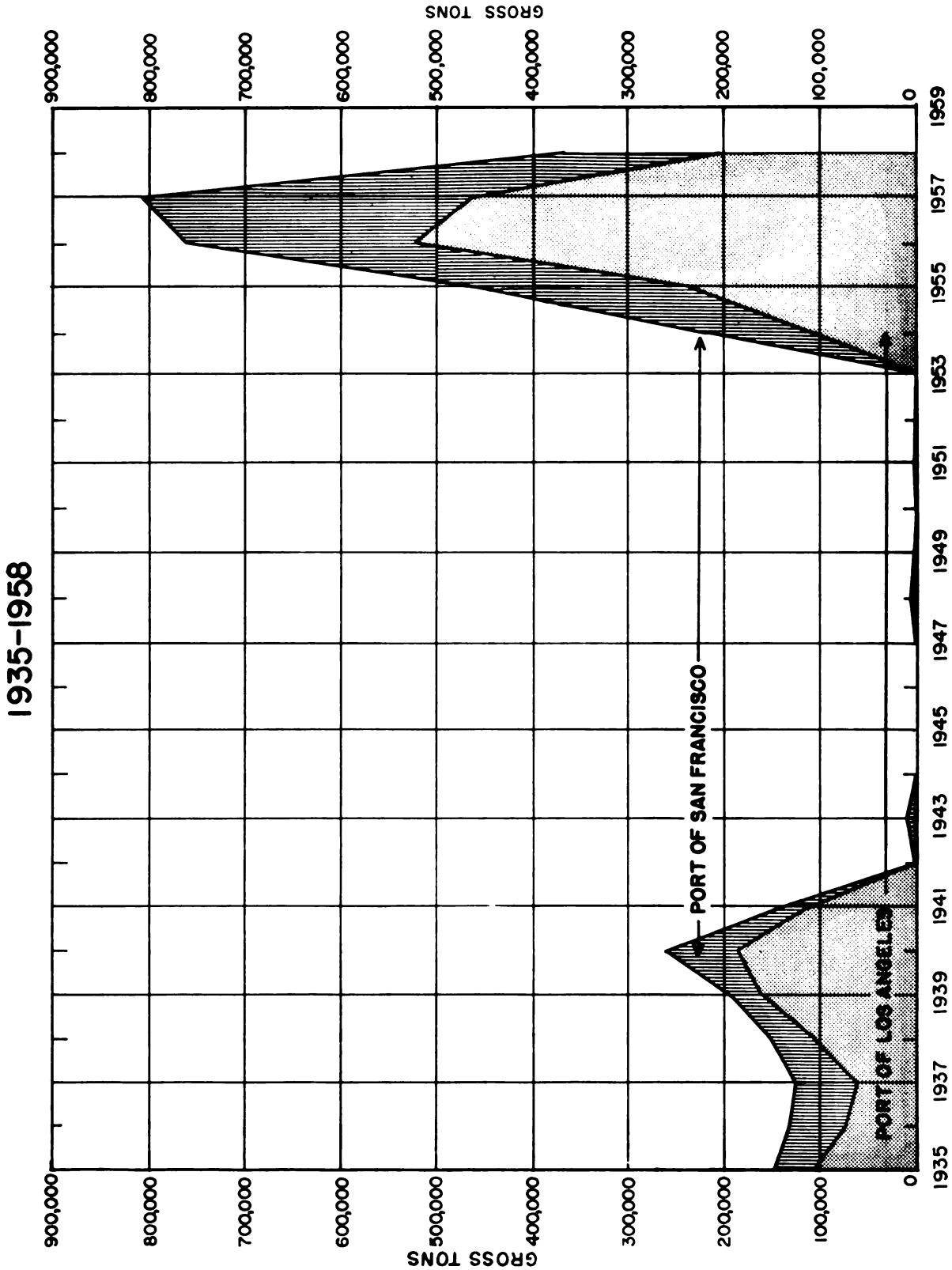

FIGURE 16. - Foreign Exports of Iron and Steel Scrap from Los Angeles and San Francisco, 1957.

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FIGURE 17. - Loading Scrap for Export, Parr-Richmond Terminal, Richmond, Calif.

From table 10 it will be noted that during 1935 to 1941 the maximum figure was 264,606 gross tons in 1940. From 1942 to 1953, a period of 11 years during World War II and the Korean conflict, exports were zero or negligible owing to Government embargo. After the relaxation of Government controls in October 1953, exports rose rapidly in 1954, 1955, and 1956. In 1957, exports were at an alltime maximum of 809,321 gross tons.

SOURCES OF SUPPLY

Home Scrap

Ferrous home scrap, by definition, is generated at the point of manufacture of ferrous products. The generation by counties or groups of counties in southern and northern California in 1957, according to the Bureau of Mines canvass of consumers, was as follows:

Southern California			Northern California		
County	Gross tons	Number of Generators	County	Gross tons	Number of Generators
Los Angeles.....	211,484	31	San Francisco..	46,767	5
			San Mateo.....		
Orange.....	502,218	6	Alameda.....	79,662	14
Ventura.....					
San Diego.....			Contra Costa...	130,819	3
Kern.....					
San Bernardino..			Sacramento.....	8,871	3
			Fresno.....		
			Calaveras.....	1,024	3
			Nevada.....		
			San Joaquin....		
			Shasta.....		
Total.....	713,702	37	Total.....	267,143	28
Percentage.....	72.8		Percentage.....	27.2	

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Totals for California were 980,845 gross tons and 65 generators.

Table 11 shows the breakdown by grade. (There was only one generator of home scrap on record in Nevada in 1957, and the tonnage figure is confidential.

Purchased Scrap

Sources by Grades

Six of the largest dealers in southern California and six in northern California supplied estimates, by grades, of the source of all scrap consumed in the areas in which they operated in 1957. Table 12 summarizes their estimates, and figure 18 shows the data graphically.

The Nevada cities of Reno, Carson City, and Fallon provide a small secondary supply to the San Francisco area, and Las Vegas and Henderson provide a small supply to the Los Angeles area.

Prompt Industrial Scrap

As stated in the chapter on "Demand and Supply of Iron and Steel Scrap," the number of firms producing prompt industrial scrap in California in 1957 is estimated at more than 1,600 and the generation of such scrap at 140,000 gross tons. On the assumption that this scrap had the same proportionate distribution as to the types of generating plants in California as the national generation, the distribution is shown in table 13. Column 1 lists the 18 types of industry which, nationally, produced 100,000 net tons or more of prompt industrial scrap in 1954. Column 2 shows the percentage of the national production derived from each type of the 18 national types of industry. These percentages are applied to the 140,000 gross tons for California, and the resulting tonnages are shown in column 3. Columns 4 and 5 show, respectively, the number of plants of each industrial type in California in 1954 and their total employment in 1954. No figures on prompt industrial scrap generation were given by the Bureau of the Census for Nevada in 1954, and it is assumed that the 1957 generation was negligible.

It is of interest that the Metal and Thermit Corporation operates a detinning plant in South San Francisco which is one of the major producers of No. 1 bundles in the State.

Obsolete Scrap

Three major sources of obsolete scrap in California and Nevada are: (1) Automobiles, (2) railroads, and (3) military establishments. A fourth source, the Maritime Administration, is a California source only. These sources are discussed separately.

Automotive Scrap

Obviously, a close relationship exists between population and the number of motorcars in use. Table 14 indicates this relationship and its relation to the scrap-consumption pattern.

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TABLE 11. - Home iron and steel scrap produced in California, by grade, 1957, in gross tons

Grade	Southern California		Northern California		Total	
	Gross tons	Percent	Gross tons	Percent	Gross tons	Percent
No. 1 Heavy Melting	271,858	58.8	190,783	41.2	462,641	100.0
No. 2 Heavy Melting	7,973	100.0	-	-	7,973	100.0
Bundles	-	-	-	-	-	-
Low phosphorous	14,427	50.0	14,428	50.0	28,855	100.0
Cast iron, other than borings	107,049	68.0	50,376	32.0	157,425	100.0
Turnings and/or borings, alloy free	1,531	91.0	151	9.0	1,682	100.0
Rerolling rails	-	-	-	-	-	-
Scrap rails	279	100.0	-	-	279	100.0
High-speed steel	-	-	-	-	-	-
Stainless steel	695	48.0	753	52.0	1,448	100.0
All other alloy iron and steel	9,380	79.0	2,494	21.0	11,874	100.0
All other prepared	108,004	98.0	2,204	2.0	110,208	100.0
Unprepared	192,506	97.0	5,954	3.0	198,460	100.0
Total	713,702	72.8	267,143	27.2	980,845	100.0

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TABLE 12. - Estimated sources of purchased scrap iron and steel, by grades, in California, 1957, percent

Grade	Southern California		Northern California	
	Col. 1, source in 7 southern California counties[1]	Source in 9 southern California counties outside of areas listed in column 1[2]	Col. 2, source in 9 counties surrounding San Francisco Bay[3]	Source in 22 northern California counties outside of areas listed in column 3[4]
No. 1 Heavy Melting..	85	15	70	30
No. 2 Heavy Melting..	90	10	65	35
Bundles.....	95	5	70	30
Low phosphorous.....	95	5	60	40
Cast-iron other than borings.....	90	10	60	40
All others.....	80	20	70	30
Weighted average.....	89	11	66	34

1/ Parts of Los Angeles, Ventura, Santa Barbara, San Diego, San Bernardino, and Riverside Counties and all of Orange County.

2/ Parts of Los Angeles, San Diego, Riverside, Imperial, Ventura, San Luis Obispo, Santa Barbara, Kern, and San Bernardino Counties.

3/ Parts of San Mateo, Santa Clara, Alameda, Contra Costa, Solano, Napa, Sonoma, and Marin Counties and all of San Francisco County.

4/ Parts of San Mateo, Monterey, San Benito, Santa Clara, Alameda, Contra Costa, Solano, Napa, Kings, Tulare, Fresno, Madera, Merced, Stanislaus, San Joaquin, Sacramento, Yolo, Sutter, Placer, Nevada, Yuba, and Butte Counties and all of Santa Cruz County. The cities of Red Bluff, Redding, Eureka, and Yreka are added as separate areas.

Table 15 gives the percentage relationship on a county basis for six selected counties.

The close relationship between total car registrations and population also exists between total cars scrapped and population. Thus, the ratio between the number of cars scrapped and total car registrations on a national basis was 7.6 percent in 1956 and 7.3[11] percent in 1957.[9] If, as indicated in the chapter on "Demand and Supply of Iron and Steel Scrap," it is assumed that the cars not re-registered are numerically equal to the number which move from the wrecking yards and are sold for scrap during the first year of non-re-registration, it is then possible to estimate the geographic source of this scrap.

11/ Automobile Manufacturers Association, Automobile Facts and Figures, 1957, 1958.

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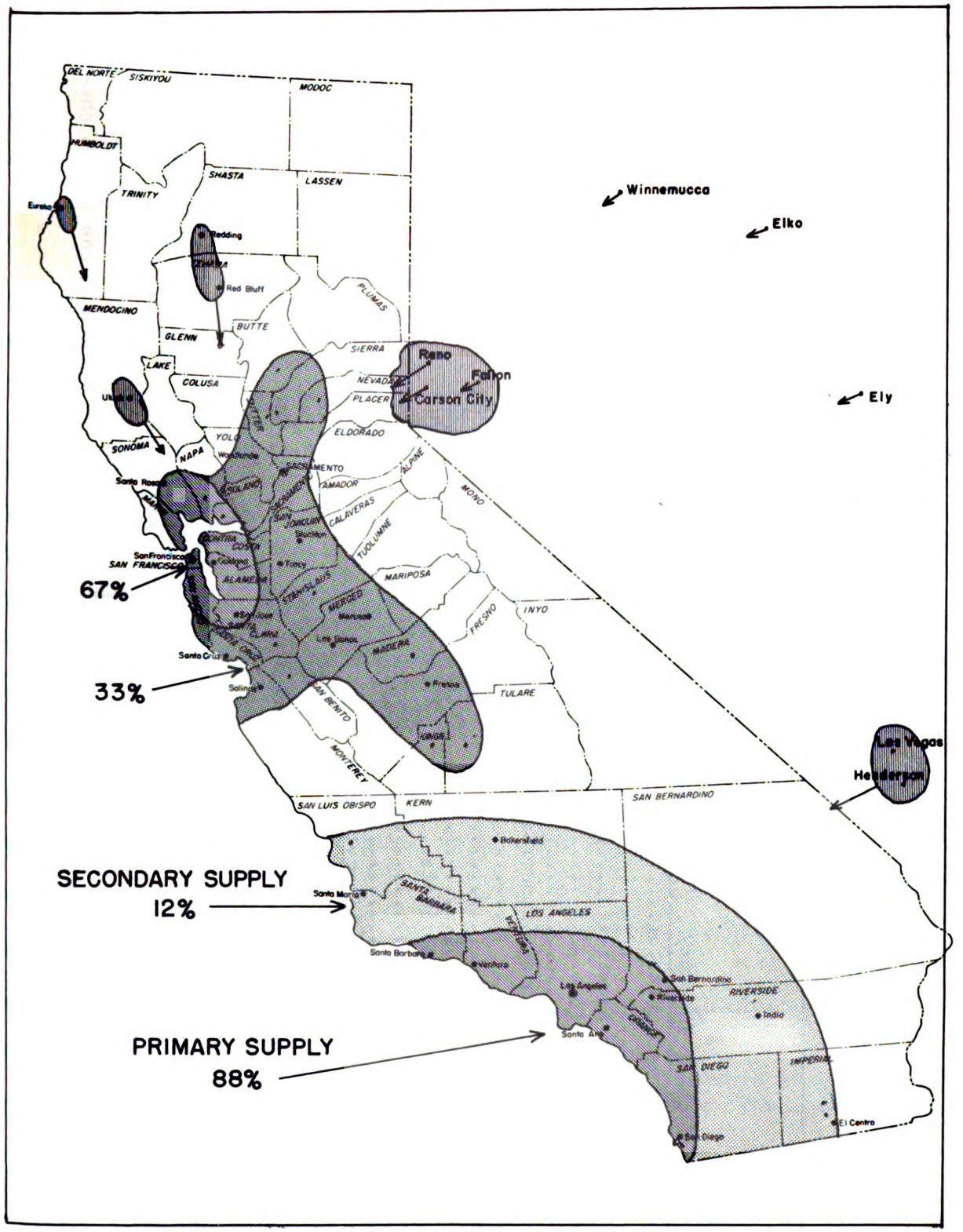

FIGURE 18. - Primary and Secondary Source Areas of Scrap Purchases in California and Nevada, 1957.

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TABLE 13. - Estimated distribution of prompt industrial scrap produced in California, 1957

Type of industry	Percentage of total national tonnage of scrap for industries shown, 1954	Estimated California distribution of 140,000 gross tons of industrial scrap, gross tons	Number of California plants, 1954 1/	California employment, 1954 1/
Motor vehicles and parts.....	50.5	70,700	186	21,010
Metal stampings.....	8.8	12,320	209	4,447
Tin cans and other tinware 2/.....	5.9	8,280	38	7,353
Iron and steel forgings.....	4.0	5,600	24	853
Tractors.....	3.3	4,620	13	109
Structural and ornamental ironwork...	3.1	4,340	262	861
Motors and generators.....	2.8	3,920	n.a.	n.a.
Farm machinery.....	2.5	3,500	167	2,812
Boilershop products.....	2.3	3,220	92	7,048
Bolts, nuts, washers, and rivets.....	2.2	3,080	48	2,160
Hardware.....	2.1	2,940	125	5,796
Ball and roller bearings.....	2.0	2,800	n.a.	n.a.
Construction and mining machinery....	2.0	2,800	71	2,534
Heating and cooking equipment.....	1.9	2,660	110	6,863
Ship welding and repairing.....	1.6	2,240	38	11,077
Oilfield machinery and tools.....	1.4	1,960	62	5,358
Screw machinery products.....	1.4	1,960	164	2,471
Railroad and streetcars.....	1.4	1,960	n.a.	n.a.
Adjustment.....	.8	120		
Total.....	100.0	140,000	1,609(inc)	80,752(inc)

1/ U.S. Department of Commerce, Census of Manufacturers 1954, vol. 3, Area Statistics.
2/ One of the largest detinned scrap producers in northern California is the Metal & Thermit Corp., of South San Francisco, with annual production considerably in excess of the figure shown in column 3.

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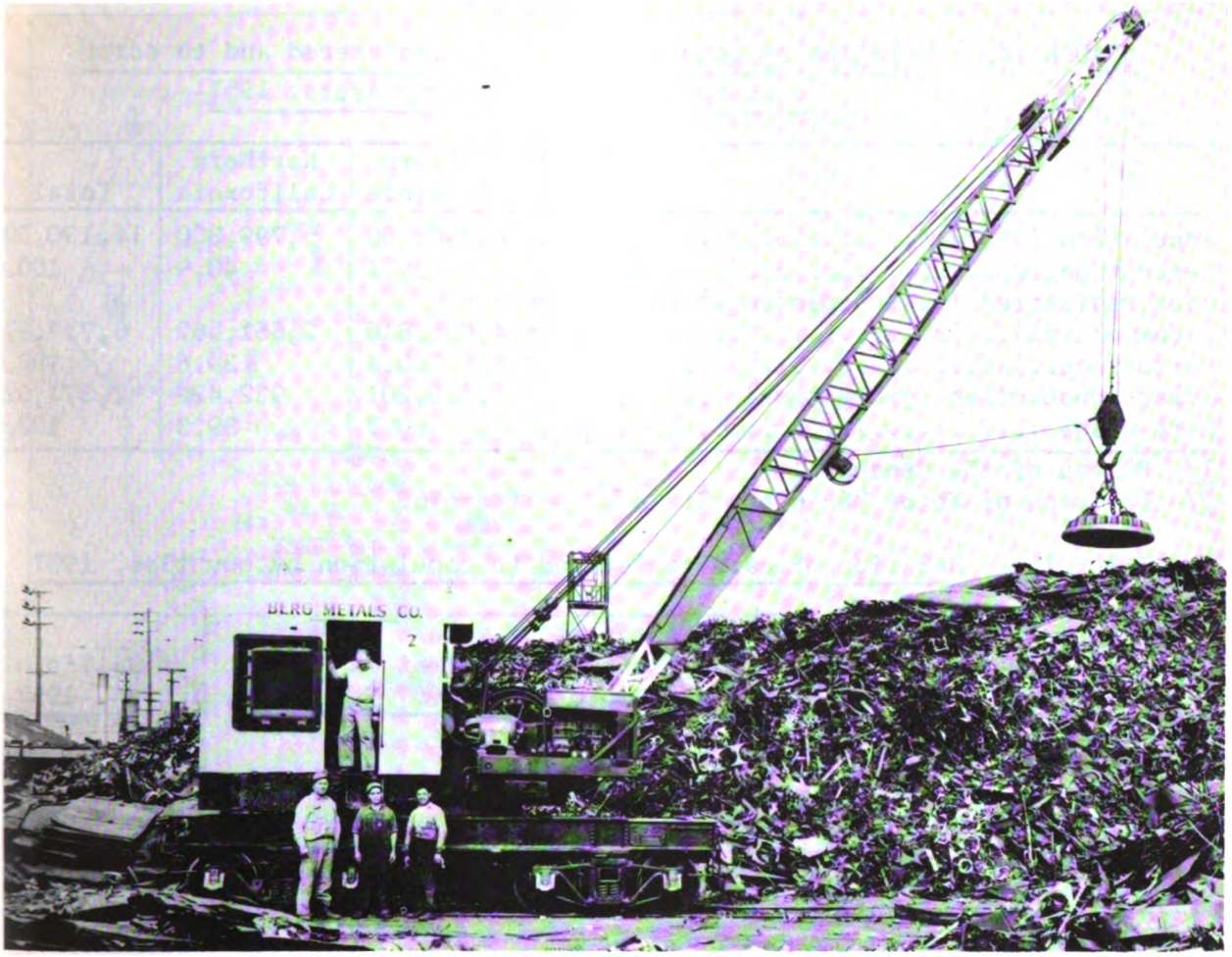

FIGURE 19. - Prompt Industrial Scrap With Locomotive Crane and Magnet.

If this relationship is applied to southern and northern California, the following figures are obtained:

$$\frac{8,390,700}{14,190,000} = 0.591 \times 400,003 = 236,449 \text{ gross tons for southern California.}$$

$$\frac{5,799,300}{14,190,000} = 0.409 \times 400,083 = 163,634 \text{ gross tons for northern California.}$$

The geographic distribution of car-wrecking establishments is significant with respect to the generation of automotive scrap in 1958. The distribution was as follows:

	Number	Percent
Southern California.....	691	56.0
Northern California.....	542	44.0
Total.....	1,233	100.0
Nevada.....	21	

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TABLE 14. - Relation of population to cars registered and to scrap consumption, by geographic areas, 1957

	Southern California	Northern California	Total
Population (1957)[1]	8,390,700	5,799,300	14,190,000
Percentage	59.1	40.9	100.0
Cars registered 1957[2] (passenger and commercial)	4,055,810	2,661,562	6,717,372
Percentage	60.4	39.6	100.0
Scrap consumption (gross tons)	1,439,201	932,422	2,371,623
Percentage	60.7	39.3	100.0

1/ Bureau of the Census.
2/ Division of Motor Vehicles, State of California.

TABLE 15. - Relation of cars registered to population by counties, 1957

	Percent of total California registration of motorcars, 1957	Percent of California population, 1957
Alameda	5.8	6.2
Contra Costa	2.5	2.5
Santa Clara	3.7	3.7
Sacramento	2.9	3.0
Fresno	2.5	2.4
Orange	3.7	3.7

This distribution is shown graphically in figure 20.

Grade Breakdown

The grade breakdown of the iron and steel scrap in a motor car varies with the make and model; however, the following figures represent the consensus of several dealers as to the average recovery from a 3,000-pound car.

	Pounds
No. 1 Heavy Melting, if separated, otherwise No. 2 Heavy Melting (springs, gears, crankshaft)	250
No. 2 Heavy Melting (frame, steel wheels, rear end, and front axle)	450
No. 2 Bundles (body tin and bumpers)	1,200
Cast iron (motor block)	300
Nonmetal and nonferrous metal	800
Total	3,000

These figures do not consider the weight of the parts removed for sale by the parts dealer.

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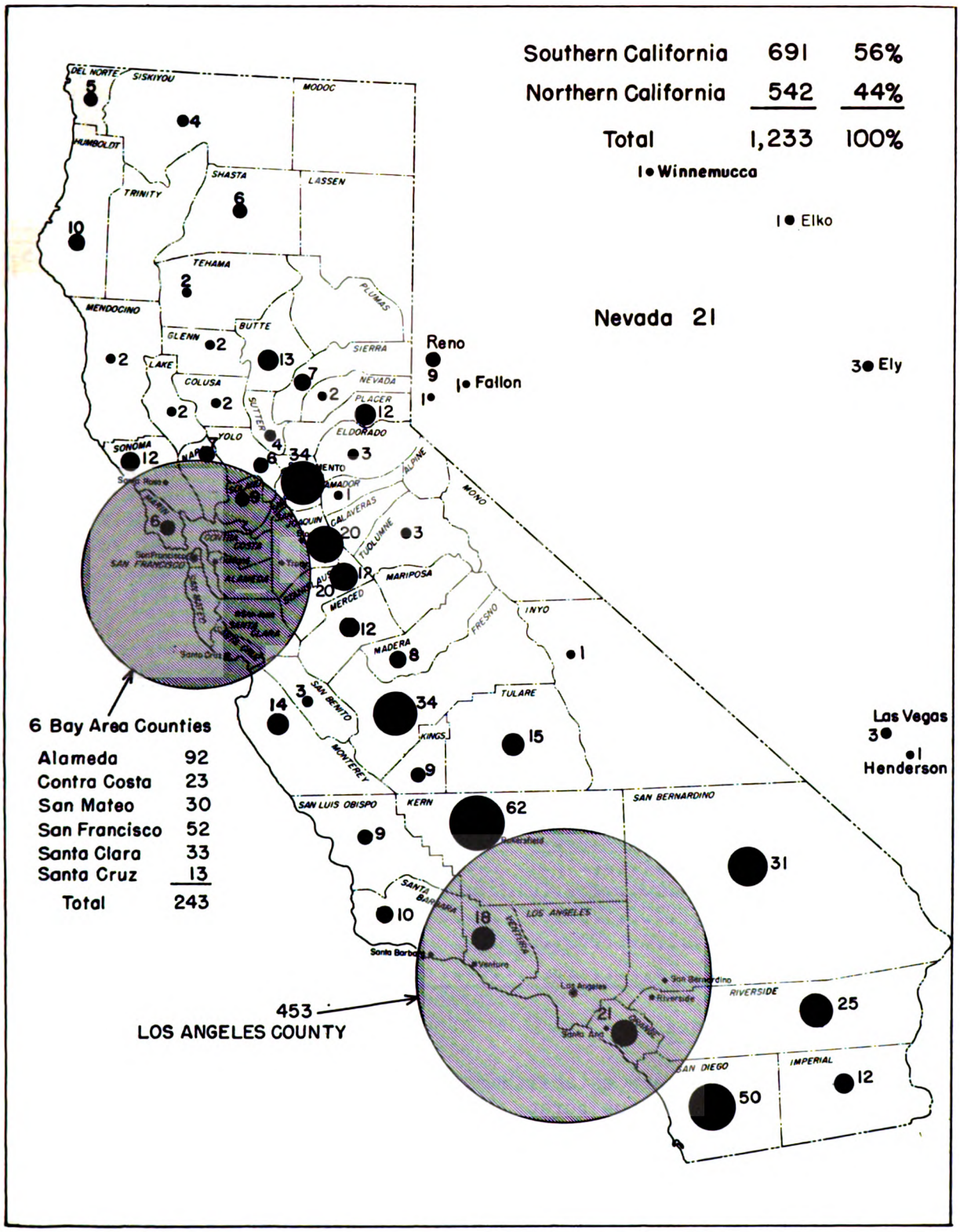

FIGURE 20. - Car Wrecking Establishments in California and Nevada, 1958.

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Railroads

There were 39 railway companies listed[12/] as active in California in 1958 and 7 in Nevada. Most of the railroad scrap generated in California, however, comes from four major systems: Southern Pacific, Atchison, Topeka and Santa Fe, Western Pacific, and Union Pacific. Their respective operating mileages in California and Nevada on December 31, 1958, were as follows:

Railroad	California	Nevada	Total
Southern Pacific	3,994.34	665.60	4,659.94
Santa Fe	1,416.17	-	1,416.17
Western Pacific	592.98	450.50	1,043.48
Union Pacific	380.96	293.80	674.76
Total	6,384.45	1,409.90	7,794.35

These figures indicate only the relative scrap potential of these four systems in California and Nevada and do not provide specific scrap data. The generation of railroad scrap in California and Nevada may or may not be closely related to the railroad scrap actually sold in California and Nevada, as scrap is generated at many points on a railroad system, but its point of delivery to a buyer depends on demand and price. Accordingly, railroad scrap sold in California and Nevada may have been generated outside of the States. Table 16 shows the railroad scrap reported as sold in California in 1957 by the four major railroads.

TABLE 16. - Obsolete iron and steel scrap sold by major railroads in California, 1957, in gross tons

	Southern California	Northern California	Total
No. 1 Heavy Melting	20,377	15,215	35,592
No. 2 Heavy Melting	6,562	710	7,272
Cast iron	4,812	1,249	6,061
Rails	16,852	7,329	24,181
Unprepared	12,844	9,801	22,645
Turnings	477	52	529
Total	61,924	34,356	96,280

Military Establishments

There are 46 military establishments in California and Nevada, all of which are sources of ferrous scrap. Table 17 gives the tonnages of scrap reported as sold in California in 1957 by Air Force, Army, Navy, and Marine Corps bases by grade, and table 18 lists the bases. Sales of scrap are made only through the sales offices indicated. Figure 21 shows the location of all bases.

12/ Rand McNally and Co., Commercial Atlas and Marketing Guide, 1958.

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TABLE 17. - Obsolete scrap sold by military installations in California, 1957, in gross tons

Southern California

	Army and Air Force	Navy and Marine Corps	Total
No. 1 Heavy Melting		1,582	1,582
No. 2 Heavy Melting		3,474	3,474
Cast iron	6	342	348
Turnings and borings		20	20
Scrap rails		107	107
Stainless steel		23	23
All other prepared	4		4
Unprepared	325	9,561	9,886
Total	335	15,109	15,444

Northern California

	Army and Air Force	Navy and Marine Corps	Total
No. 1 Heavy Melting	1,170		1,170
No. 2 Heavy Melting	384		384
Bundles	5,013		5,013
Cast iron	63		63
Busheling	40		40
Scrap rails	308		308
Unprepared	10,859		10,859
Unclassified		29,268	29,268
Total	17,837	29,268	47,105
Grand total	18,172	44,377	62,549

TABLE 18. - Military installations in California and Nevada, 1958

Air Force Bases1/

1. Mather Air Force Base, Sacramento.
2. McClellan Air Force Base, Sacramento.
3. Travis Air Force Base, Fairfield.
4. Hamilton Air Force Base, San Rafael.
5. Parks Air Force Base, Pleasanton.
6. Castle Air Force Base, Merced.
7. Vandenburg Air Force Base, Lompoc.
8. Edwards Air Force Base, Edwards.
9. George Air Force Base, Victorville.
10. Norton Air Force Base, San Bernardino.

See footnote at end of table.

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TABLE 18. - Military installations in California and Nevada, 1958 (Con.)

11. March Air Force Base, Riverside.
12. Maywood Air Force Base, Maywood.
13. Stead Air Force Base, Reno.
14. Nellis Air Force Base, Las Vegas.

Army Bases

15. Sierra Ordnance Depot, Herlong.
16. Sacramento Signal Depot, Sacramento.
17. Benecia Arsenal, Benecia.
18. Oakland Army Terminal, Oakland.
19. Sharpe General Depot, Lathrop.
20. Fort Ord, Monterey.
21. Fort MacArthur, San Pedro.
22. Headquarters Sixth Army, Presidio, San Francisco.2/
23. Alameda Administrative Center, Alameda.
24. Los Angeles District, Corps of Engineers, Los Angeles.
25. Sacramento District, Corps of Engineers, Sacramento.
26. San Francisco District, Corps of Engineers, San Francisco.
27. Branch of U.S. Disciplinary Barracks, Lompoc.
28. Camp Irwin, Barstow.
29. San Francisco Ordnance District, Oakland.
30. Los Angeles Ordnance District, Pasadena.

Naval Bases

31. Marine Corps Air Station, El Toro.2/
32. Marine Corps Supply Center, Barstow.2/
33. Support Battalion Marine Corps Base, Camp Pendleton.2/
34. Naval Construction Battalion Center, Port Hueneme, Long Beach.2/
35. Naval Shipyard, Long Beach.2/
36. Naval Supply Depot, San Diego.2/
37. Naval Air Station, San Diego.
38. Supervising Inspector, Naval Materials, Los Angeles.
39. Naval Supply Center, Oakland.2/
40. Naval Supply Annex, Stockton.
41. Mare Island Naval Shipyard, Vallejo.
42. San Francisco Naval Shipyard, (Hunters Point), San Francisco.
43. Naval Station, Treasure Island, San Francisco.
44. Naval Ammunition Depot, Concord.
45. Naval Ammunition Depot, Hawthorne, Nev.
46. Naval Air Station, Fallon, Nev.

1/ Sales are made through the National Bidders Control Center, P.O. Box 286, Kelley Air Force Base, Tex.

2/ Surplus property sales offices.

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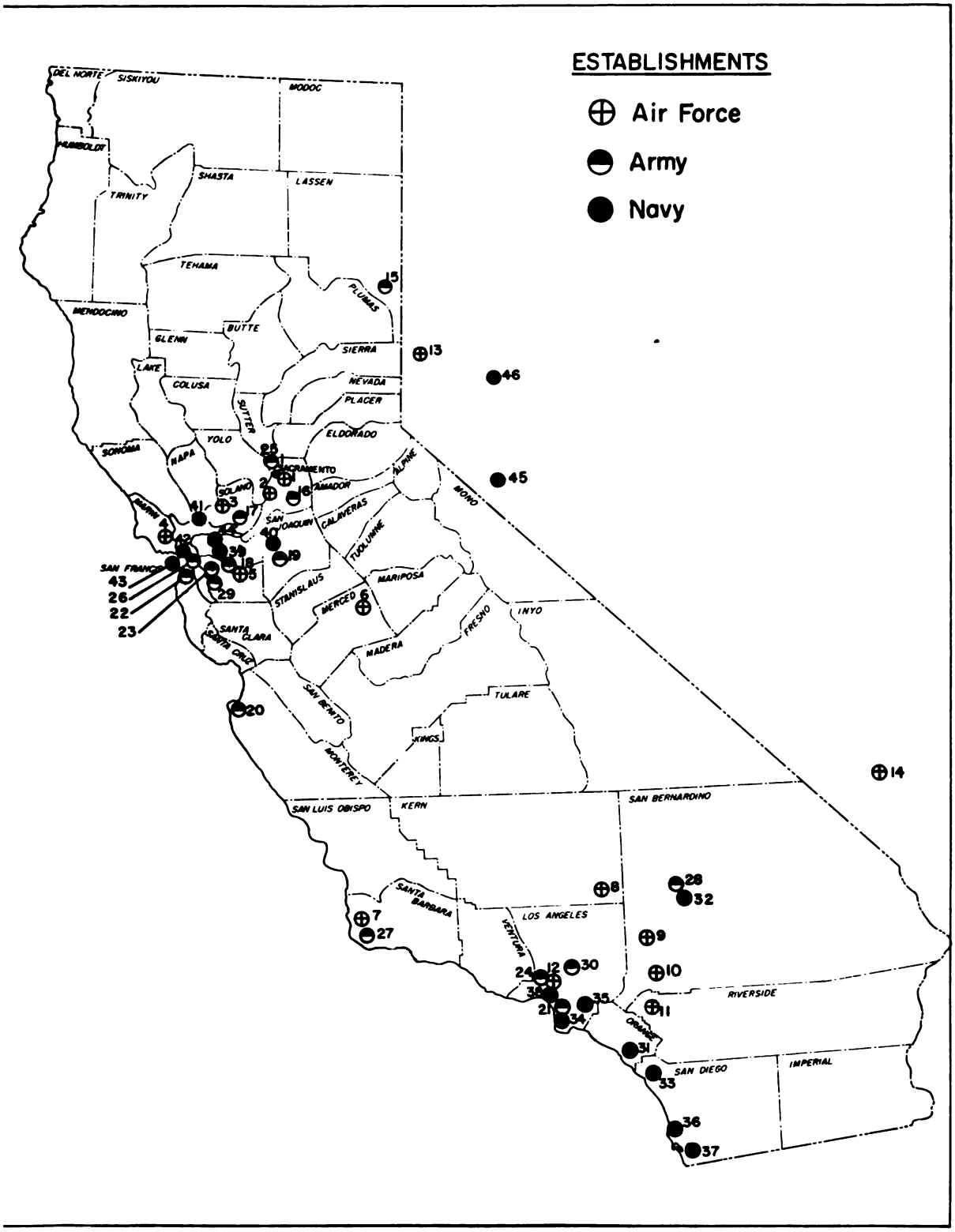

FIGURE 21. - Military Establishments in California and Nevada, 1958.

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Maritime Administration

The Maritime Administration is an agency of the U.S. Department of Commerce. Among its activities, it is charged with the administrative control of the so-called "moth-balled" fleets of freight-carrying vessels and naval auxiliaries which operated under the War Shipping Administration in World War II. There are three such reserve fleets on the Pacific coast located, respectively, at Olympia, Wash., Astoria, Oreg., and Suisun Bay, Calif. Some of these Liberty-type vessels become uneconomic to operate and are sold each year for scrap. They constitute a large reserve of ferrous scrap in the near future. In 1957 the tonnage sold for scrap from the Suisun Bay Reserve Fleet was 14,250 gross tons. In 1958, 29,600 gross tons were sold, and sales are expected to accelerate in the future. Most of this scrap is steel. The present law permits scrapping either in the United States or in a foreign port after sale to a domestic dealer or broker. Present plans provide for scrapping 120 vessels from the Suisun Bay Reserve Fleet during the 5-year period beginning August 1, 1959. The iron and steel scrap obtainable from one Liberty ship averages about 3,300 gross tons. Therefore, the 5-year potential from this source is 396,000 gross tons (figs. 22 and 23).

Liberty ships selected for domestic scrapping sell for about $70,000 each and require about 2 months to cut up at a dock for final preparation in a yard. The cost of cutting is about $45,000 to $55,000 per vessel when scrap is prepared to meet mill requirements. When sold for foreign delivery, the price is about $90,000 per vessel. Towing cost to Japan is $40,000 to $60,000.

Dealer Distribution

Because nearly all of the purchased scrap is supplied to consumers and exporters by dealers and because dealers may act as exporters, the county-by-county distribution of dealers indicates the geographic sources of scrap iron and steel. To be noted is the close similarity in distribution of dealers in 1958 and scrap consumption in 1957.

	Dealers, 1958		Scrap consumption, 1957, percent
	Number	Percent	
Southern California[1/]	384	62.3	60.7
Northern California[2/]	232	37.7	39.3
Total	616	100.0	100.0
Nevada	13		

1/ South of the northern boundary of San Luis Obispo, Kern, and San Bernardino Counties.
2/ Remainder of State.

The county distribution of dealers is shown graphically in figure 7.

Special Supply Problems

Purchased scrap has only two local supply problems. These pertain to reroll rails and cast iron.

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FIGURE 22. - Battleship Maryland Being Scrapped in the Oakland Estuary by the Todd Shipyards Corp.

Reroll Rails

There is a continual industrial demand for reroll rails in the San Francisco area, which is not always met from supplies within the area. From time to time shipments are made from southern California, Nevada, Oregon, Washington, or Utah, as supplies can be found. It is estimated that the San Francisco area is about 70 to 75 percent self-sufficient in reroll rails. As the 1957 receipts were 6,681 gross tons for northern California (table 5, p. 28), the interstate rail movement into the San Francisco area was about 1,700 to 2,000 gross tons. This figure is consistent with rail import figures shown in table 9, page 36. The principal user of reroll rails in northern California is Simmons Co. of San Francisco. In southern California, the principal user is Southwest Steel Rolling Mills. Wesco Steel Rolling Mills, Los Angeles, is a user of a small tonnage.

Cast Iron

It is estimated that the San Francisco area lacks about 50,000 gross tons a year of cast iron to meet the annual area demand. This cast iron comes from southern California, Nevada, Oregon, Washington, and Utah, as supplies can be found. Since 1957 receipts in northern California were 99,353 gross tons (table 5), the Bay area was only 50 percent self-sufficient in cast iron that year. A rail import of 50,000 gross tons of cast iron is consistent with the figures shown in table 9.

Reserves

The President's Material Policy Commission[13/] stated that the domestic generation of home and prompt industrial iron and steel scrap is proportional to the output of steel ingots. Therefore, the Commission concluded that the

13/ Resources for Freedom, vol. 2, 1952, p. 13.

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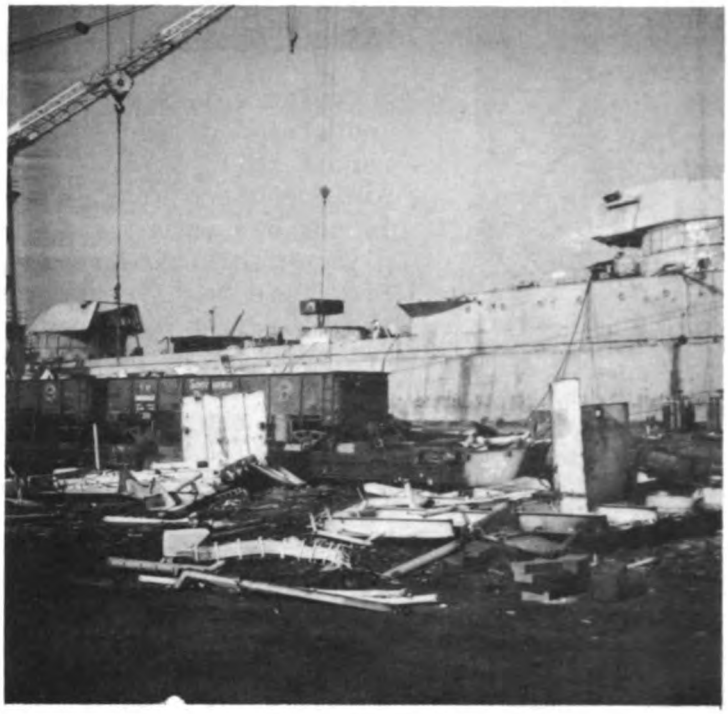

FIGURE 23. - Cutting Operations on the Maryland. Gondola cars are being loaded for shipment to scrapyard for final preparation.

availability of scrap depends almost entirely upon the supply of obsolete scrap. Adequate data on obsolete scrap were not available when the report was prepared. However, in 1956, the Department of Commerce contracted with the Battelle Memorial Institute, Columbus, Ohio, to study the domestic availability of obsolete iron and steel scrap. A report (3)[14] was published January 15, 1957, and a supplemental report (4), December 31, 1957. These reports, although not intended as a final analysis, represent the most comprehensive attempt to date to estimate the domestic obsolete-scrap reserves. The following procedure utilizes the Battelle figures as a basis for estimating the reserves of scrap in California.

The estimated population of the United States and California and their respective ratios for 1957, 1960, and 1965 are:

	United States	California	Ratio, Calif. to U.S.
1957.....	171,196,000	13,594,000	0.0794
1960.....	181,154,000	15,830,000	.0874
1965.....	195,747,000	18,754,000	.0958

By applying these ratios to the figures for potentially recoverable iron and steel by potential grade of scrap for the corresponding years, as given in table 2 of the Battelle report of December 31, 1957 (4), the following California reserve estimate, in thousand gross tons, is obtained:

	Total	Heavy melting	Bundles	Cast iron
1957.....	39,965	12,407	10,605	16,953
1960.....	45,489	12,988	13,684	18,817
1965.....	53,137	13,158	18,655	21,324

14/ Bibliography, items 3 and 4

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Such estimates obviously are far from being either firm or conclusive; however, they are based on the most reliable data obtainable. It is interesting that the ratios of these figures to receipts of new scrap by consumers in California in 1957 (table 5, p. 28) give the following years of available supply dating from January 1, 1957.

	Years
Total reserves	28.7
Heavy Melting	22.4
Bundles	28.4
Cast iron	73.8

ECONOMICS OF THE INDUSTRY

As the price paid for delivered prepared scrap in 1959 was $0.009 to $0.022 per pound, it is a low-value commodity. If a sales profit is to be realized by a dealer, it is essential that transportation, handling, and preparation unit costs be minimized. For this reason the tendency of dealers for 20 years or more has been to increase the size and power of their yard equipment and thus reduce unit labor and processing costs by increasing the volume of scrap processed. Present-day investment in a large yard is frequently $1 million or more. This fact alone has forced some small dealers out of the scrap business or brought about business consolidations to reduce unit costs. Dealers often develop sidelines of material for re-use (such as pipe or structural parts) in order to stay in business.

An integrated steel mill is usually constructed to use hot metal almost exclusively for about 50 to 60 percent capacity, because over a period of years a plant will not often operate substantially beyond that level. However, when the plant operates above that level, it becomes progressively more practical to increase the proportion of scrap used instead of hot metal. At present, the Kaiser Steel Corp. mill at Fontana is the only fully integrated mill in California. About 70 percent of the mill demand for scrap is from partly integrated or nonintegrated mills, and scrap is essential to their operation. The price such mills pay is largely a matter of competition for scrap between the mills and exporters of scrap.

Although prepared scrap is usually classed as a manufactured product, requiring labor to be added to a raw material, the scrap dealer cannot set his price with reference to capital investment, overhead, and operating costs, but must meet terms acceptable to mill or broker in order to sell his product. This situation is usually summed up by the dealer as "the mill sets the price." Therefore, it is not surprising that the dealer seeks access to markets independent of the mills. Export provides such a market. After removal of Federal control in 1953, exports increased consistently in 1954, 1955, 1956, and 1957 and were a major factor in raising unit California prices to the highest on record. (See Appendix 4, p. 86.)

As most scrap is delivered to dealers by 1- to 1-1/2-ton trucks, the price the trucker receives from a dealer must be such that his round-trip transportation and labor costs can be met. Owing to the wide distribution of

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dealers, the truckers' one-way haul is often less than 50 miles, but under special circumstances it may be 200 miles or more. Price is the basic factor that controls the distance hauled. The responsible dealer will usually pay a collector a price for his scrap which is his estimate of the delivered mill price less the total of his own preparation costs and profit to himself. In this way the consumer or exporter sets the price paid to the collector. The Institute of Scrap Iron and Steel is now preparing a cost-accounting manual to assist the dealer in determining his handling costs.

Most shipments from dealers to consumers move in open-gondola car by rail. Table 19 gives the carload rates from different California and Nevada points to the principal consuming areas in California, and figure 24 shows the rates graphically. It is clear that these rates limit the movement of scrap to the Los Angeles area from Bakersfield and Las Vegas on the north and northeast, whereas all other points in California and Nevada can normally ship by rail only to the San Francisco area. A small tonnage flows from California to Utah, Arizona, and New Mexico points, as shown in table 6, page 31

Air-pollution regulations have entered into the cost of preparing scrap iron and steel by burning since 1950. This applies particularly to automotive scrap. In the Los Angeles District, air-pollution regulations effective 1949-50 prohibit open-air burning of scrap but permit burning in a special-type incinerator equipped with a stack. A similar regulation (Regulation 1), adopted October 1, 1957, by the Bay Area Air Pollution Control District, prohibits open-air industrial burning in San Francisco, Alameda, Marin, San Mateo, Contra Costa, and Santa Clara Counties.

Cities outside of the Los Angeles and Bay Area districts have local regulations, some of which permit open-air burning during certain hours.

TRENDS AND OUTLOOK

Consumption

The gross consumption of iron and steel scrap (consumption plus exports) by years in California (Appendix 2) has been plotted on linear cross-section paper. (See fig. 25.) It is clear that the 1935 to 1958 trend of gross consumption is linear and not proportional. Based on the slope of the median line shown in the figure, the average gain in consumption per year is about 91,000 gross tons for the 24-year period.

The relation between gross scrap consumption in California and steel-ingot production, shown in Appendixes 2 and 3, respectively, and figure 26, indicate an almost complete parallelism between the two for the period 1935 to 1958. The scrap consumption graph was above the ingot curve from 1935 to 1948 but dropped below it in 1949, owing almost entirely to the operation of the Kaiser Steel Corp.'s integrated plant at Fontana and indicating the progressive increase in the proportion of pig iron used to scrap during the entire period. The ratio of scrap to ingot production dropped from 1.25 in 1935 to 0.84 in 1958.

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TABLE 19. - Rail freight rates in carload lots from California and Nevada points to scrap consuming centers

			Smaller minimum rate	
	Rate per gross ton	Minimum weight, M pounds	Rate per gross ton	Minimum weight, M pounds
California				
Redding to Portland, Ore.....	$13.44	80		
	19.04	50		
Redding to Seattle, Wash.....	16.58	80		
	22.40	50		
Eureka to Portland.....	24.42	80		
	28.67	50		
Eureka to Seattle.....	27.55	80		
	32.26	50		
Redding to San Francisco.....	7.84	80	$8.96	36
Redding to Richmond, Calif.....	7.84	80	8.06	36
Eureka to San Francisco.....	8.74	80	10.75	36
Eureka to Richmond.....	8.74	80	10.75	36
Fresno to San Francisco.....	5.60	80	6.50	40
	7.62	36		
Fresno to Richmond.....	5.60	80	6.50	40
	7.62	36		
Fresno to Los Angeles.....	8.06	80		
	8.74	40		
	8.96	36		
Fresno to Geneva, Utah.....	18.82	60		
	27.33	40		
Bakersfield to San Francisco.....	7.62	100		
	8.06	80		
	9.86	40		
	10.30	36		
Bakersfield to Richmond.....	7.62	100		
	8.06	80		
	9.86	40		
	10.30	36		
Bakersfield to Los Angeles.....	5.38	80		
	6.50	36		
Bakersfield to Geneva, Utah.....	18.82	60		
	24.86	40		
Nevada				
Reno to San Francisco.....	9.86	100	12.32	30
Reno to Richmond, Calif.....	9.86	100	12.32	30

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TABLE 19. - Rail freight rates in carload lots from California and Nevada points to scrap consuming centers (Con.)

			Smaller minimum rate			
			Rate per gross ton	Minimum weight, M pounds	Rate per gross ton	Minimum weight, M pounds
Nevada (Con.)						
Reno	to	Los Angeles.....	$14.78	100		
			17.92	70		
			19.04	40		
			20.60	30		
Reno	to	Geneva.....	14.78	60		
			20.60	40		
Reno	to	Tempe, Ariz.....	27.78	50		
			24.19	100		
Las Vegas	to	San Francisco.....	17.47	100		
			19.71	60		
			21.28	50		
			24.86	30		
Las Vegas	to	Richmond.....	17.47	100		
			19.71	60		
			21.28	50		
			24.86	30		
Las Vegas	to	Los Angeles.....	13.89	50		
			10.08	60		
Las Vegas	to	Geneva.....	15.01	60		
Las Vegas	to	Tempe, Ariz.....	19.49	50		
Hawthorne	to	San Francisco.....	18.14	50	15.01	100
Hawthorne	to	Richmond.....	18.14	50	15.01	100
Hawthorne	to	Los Angeles.....	21.28	50		
			15.01	100		
Hawthorne	to	Geneva.....	22.18	50		
Hawthorne	to	Tempe, Ariz.....	30.24	50		
			24.42	100		

Because the expansion of scrap demand depends largely upon the increase in the manufacture of steel products, it is significant to compare the relation between the annual production of hot-rolled iron and steel products in California and the total steel-mill product receipts, as their ratio indicates, approximately, the degree to which steel production reached its maxim potential for any year.

Table 20 shows the steel-mill product receipts[15] in California from 1952 to 1958, the tonnage of hot-rolled iron and steel products[16] manufactured, and the ratio of the two.

15/ Kaiser Steel Corporation figures.
16/ American Iron & Steel Institute.

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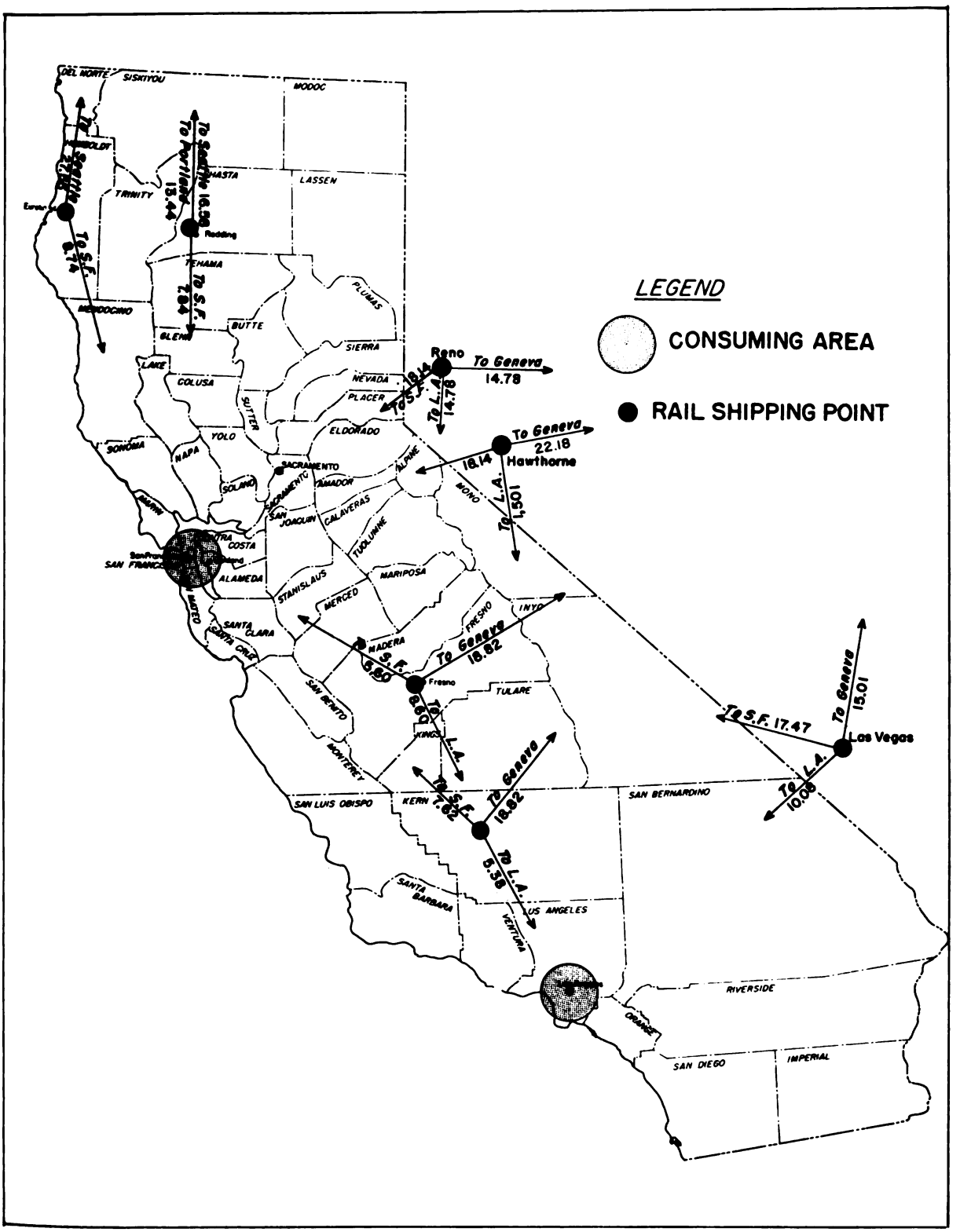

FIGURE 24. - Rail Freight Rates on Iron and Steel Scrap from California and Nevada Points to Consumption Centers, 1959.

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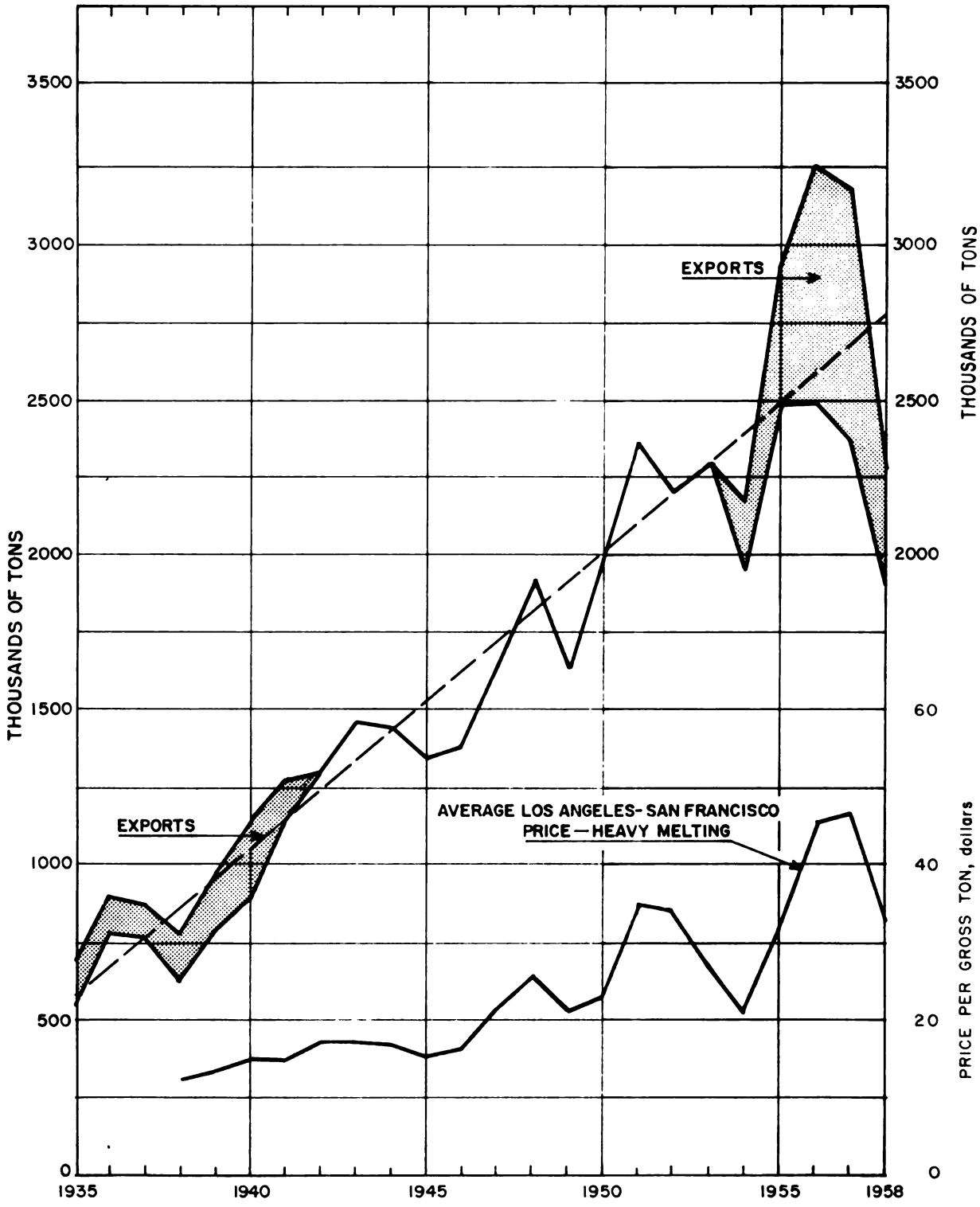

FIGURE 25. - Gross Scrap Consumption and Prices in California by Years, 1935-58.

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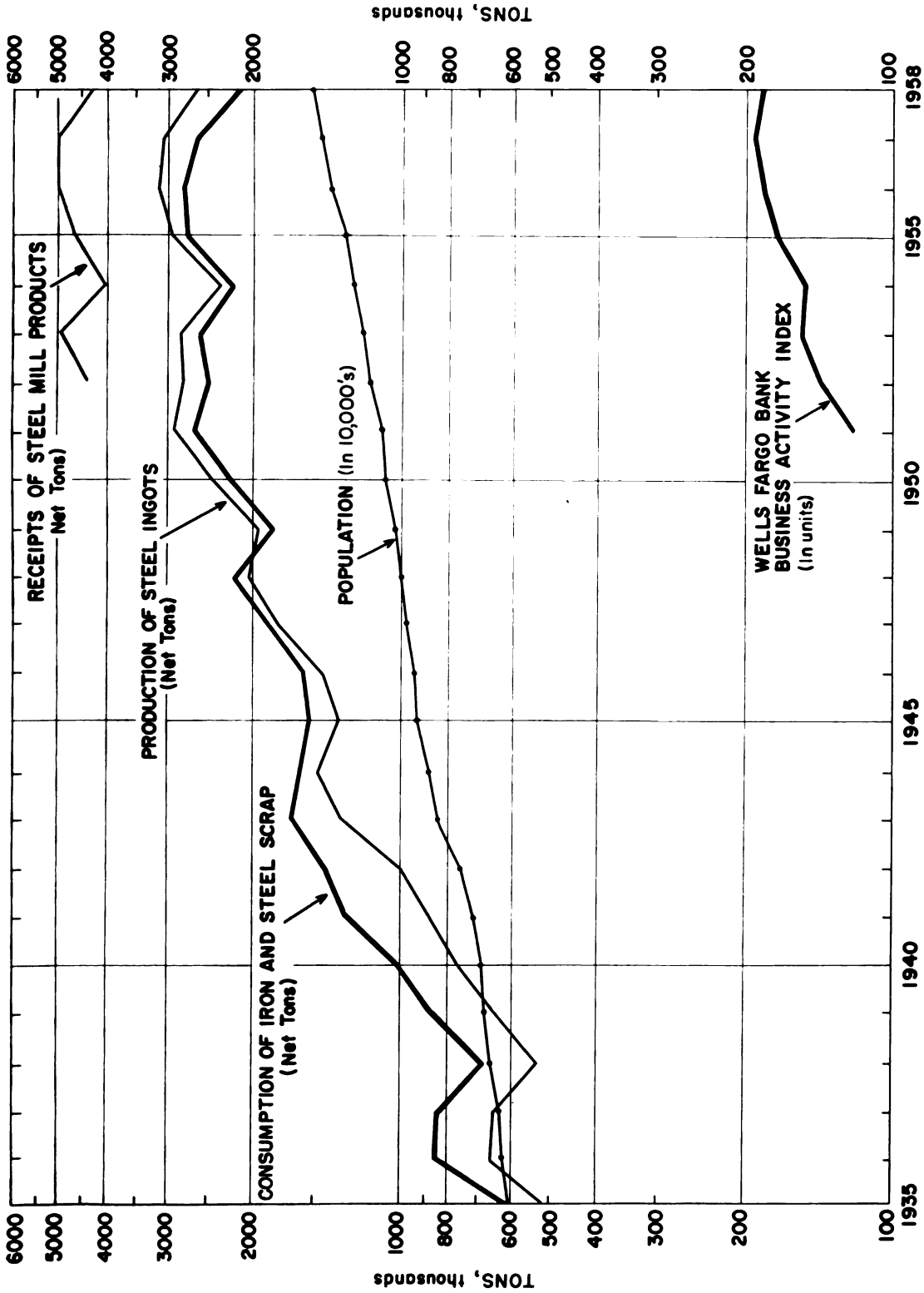

FIGURE 26. - Proportionate Relation Between Various California Economic Factors, 1935-58.

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Steel-mill product receipts do not include steel in the form of manufactured goods shipped into California annually.

TABLE 20. - Comparison of California production of hot-rolled iron and steel products and steel-mill product receipts in net tons, 1952-58

Year	Hot-rolled iron and steel products	Steel mill product receipts	Ratio of col. 1 to col. 2
1952.....	2,015,280	4,333,000	.465
1953.....	2,160,466	4,875,000	.443
1954.....	1,696,675	3,996,000	.425
1955.....	2,178,823	4,684,000	.465
1956.....	2,476,545	4,998,000	.449
1957.....	2,315,640	4,979,000	.465
1958.....	1,897,996	4,282,000	.443

These ratios indicate that a period of relative stability between the manufacture of hot-rolled iron and steel products and steel product receipts in California was reached from 1952 to 1958. How long this will continue is speculative. The aggregate capacity of the steel mills of California in 1958 was 4,676,700[17] net tons, or 9.2 percent more than the steel-mill product receipts for the year.

Two additional sets of data in figure 26 are significant. These are: (1) California population from 1935 to 1958 and (2) California Index of Business Activity,[18] 1951 to 1958, as published by the Wells Fargo Bank of San Francisco.

The population graph indicates that from 1938 to 1951 scrap iron and steel consumption generally advanced at a faster rate than population but that from 1951 to 1958 the reverse was true. The Index of Business Activity also increased faster from 1951 to 1958 than ferrous-scrap consumption. These two relationships seem to bear out the conclusion that ingot production was relatively stable from 1951 to 1958.

Exports

The record of west coast exports of scrap iron and steel is shown in table 10, Appendix 2, and figures 17 and 25. From 1935 to 1940, annual shipments rose from 149,510 to 264,606 gross tons, then dropped to 145,135 tons in 1941 and were negligible in 1942. For the next 11 years exports were negligible owing to Government embargo. After Government controls were lifted late in 1953, exports rose rapidly in 1954, 1955, and 1956 and were 809,321 gross tons in 1957 (34.1 percent of the scrap consumption). Whether this trend will

17/ Table 1.

18/ Factors included are manufacturing payrolls, department-store sales, motor-fuel sales, bank debits, engineering construction awards, all in 1944-49 dollars.

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continue is speculative, as exports are subject to Government embargo and may be reduced or eliminated, at least by grade, if it is believed the scrap reserves are being excessively depleted.

Prices

There are three sets of prices for iron and steel scrap:

1. Prices paid by a collector to a source of scrap. These prices are a matter of personal negotiation and are usually referred to as "the least possible." Sometimes nothing is paid, or the collector may be paid a small sum to haul obsolete equipment away. Some sources, however, are familiar with mill prices, then negotiation becomes related to these mill prices.

2. Prices paid by a dealer to a collector on delivery. These prices are usually posted at the dealer's scalehouse and are sometimes published in trade journals. However, they are individually determined by the dealer and represent, approximately, the delivered mill price less preparation and transportation cost and a margin of profit to the dealer. Data on these prices are very incomplete. The difference between consumer and dealer price is known as "the spread" and is usually $3 to $5 per gross ton.

3. Prices paid by a consumer to a broker, dealer, collector, or industrial source. These are delivered prices at the plant and are usually related to the grade prices as a basis for negotiation. Grade prices are published weekly in "Iron Age" or "Steel" for some 16 cities in the United States. Los Angeles, San Francisco, and Seattle prices are given for the west coast. The American Metal Market, published on weekdays, also lists prices.

Appendix 4 shows Los Angeles and San Francisco average annual price quotations for No. 1 Heavy Melting, No. 2 Bundles, and cast-iron grades from 1938 to 1958, inclusive, as published in "Steel" and "Iron Age." The heavy-melting and cast-iron prices are shown graphically in figure 27.

Although price changes for the grades have been erratic, figure 27 shows a definite upward trend in prices for the 21-year period. For No. 1 Heavy Melting grade the increase is estimated from the slope of the trend line, 1938-58, at $1.24 per gross ton per year and for No. 1 Cupola cast iron, 1947-58, at $1.17 per gross ton per year.

To compare the fluctuations in price with the fluctuations in gross demand, a price graph consisting of the average heavy-melting figures for Los Angeles and San Francisco, 1938-58, has been plotted in figure 25. These price figures per gross tons are as follows:

1938.....$12.46	1945.....$15.23	1952.....$34.00
1939..... 13.58	1946..... 16.18	1953..... 27.18
1940..... 14.86	1947..... 21.13	1954..... 20.78
1941..... 14.77	1948..... 26.12	1955..... 31.95
1942..... 17.00	1949..... 21.42	1956..... 45.40
1943..... 17.00	1950..... 22.77	1957..... 46.78
1944..... 16.56	1951..... 34.56	1958..... 32.63

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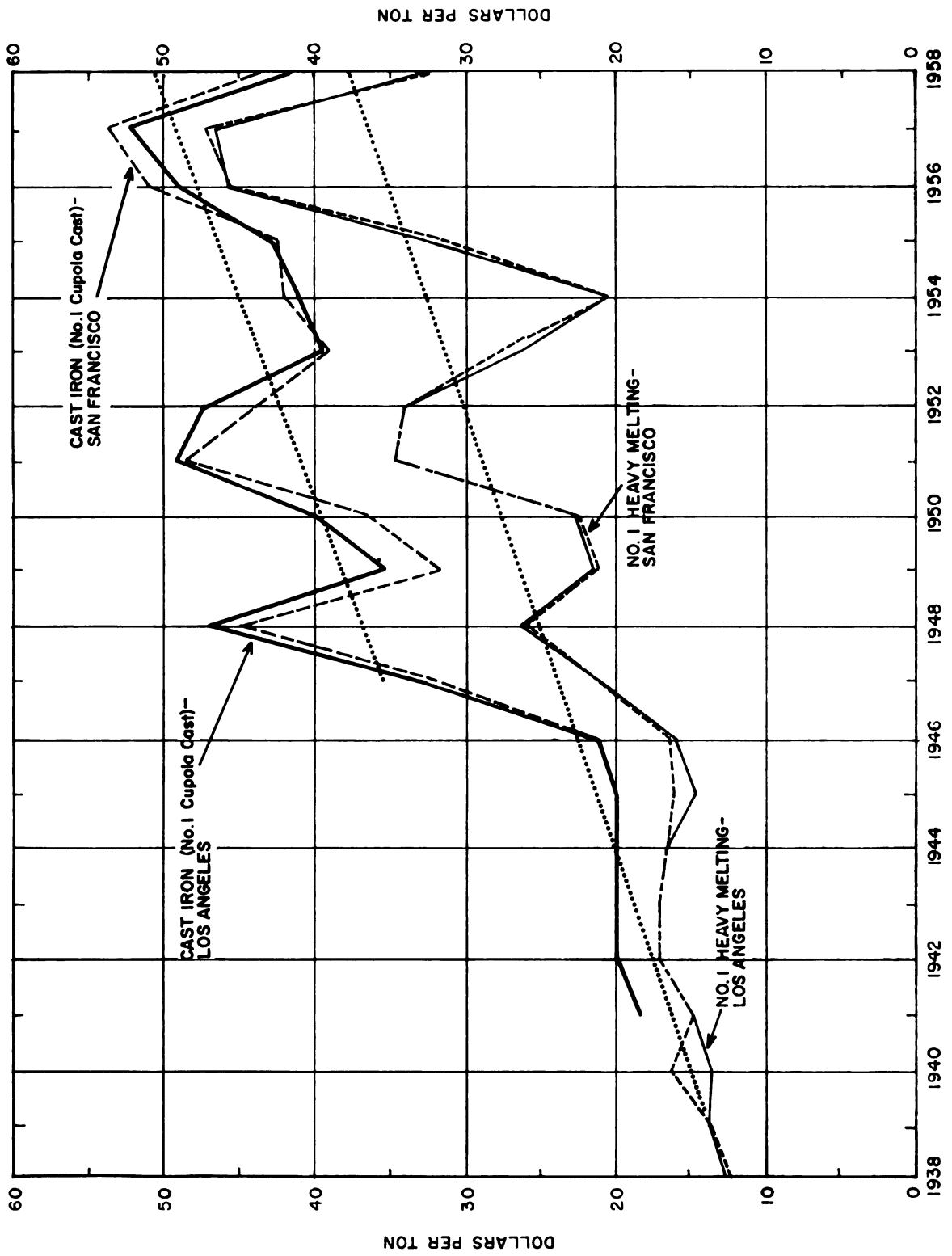

FIGURE 27. - Average Annual Prices of Scrap Iron and Steel, Los Angeles and San Francisco, 1938-58.

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Figure 25 shows that in 16 of the 20 years from 1938 to 1958, changes in demand caused price changes in the same direction. For the periods 1940-41, 1952-53, and 1956-57, price changes were in the opposite directions, and for the period 1942-43 there was no price change to correspond to an increase in demand. The 1942-43 and 1952-53 price relations may have been due to the effect of World War II and the Korean conflict, respectively. The changes in average California price per 100,000-gross-ton change in demand for the 20 pairs of consecutive years are shown in table 21, column 4.

TABLE 21. - Ferrous-scrap price changes in California, 1938-58

Years compared	Change in unit price	Increase(+) or decrease(-)	Change per 100,000 gross tons
1938-39	$1.12	+	$0.53
1939-40	1.28	+	.74
1940-41	.09	-	1/.08
1941-42	2.23	+	13.12
1942-43	(2/)	(2/)	(2/)
1943-44	.44	-	2.00
1944-45	1.33	-	1.30
1945-46	.05	+	2.44
1946-47	4.95	+	2.95
1947-48	4.99	+	1.83
1948-49	4.70	-	1.60
1949-50	1.35	+	.38
1950-51	11.79	+	3.13
1951-52	.56	-	.37
1952-53	6.82	-	1/7.41
1953-54	6.40	-	4.92
1954-55	11.17	+	1.47
1955-56	13.45	+	4.15
1956-57	1.38	+	1/1.94
1957-58	14.15	-	1.58

1/ Change in opposite direction to consumption plus exports.
2/ No price change or increase in demand.

The price increase in 1955-56 is the highest for the 21-year period. In 1955-56, exports increased from 447,376 to 761,280 gross tons (70 percent). The price changes per 100,000 tons have no special significance. Most of the figures are small, dollarwise, and are given as a matter of record.

To develop a relationship between price and gross consumption of scrap (consumption plus exports), the average price data must be deflated to remove the effects of general inflation. The wholesale price index, 1947-49=100, was used to deflate the prices. Figure 28 compares gross consumption and deflated price. The relationship changed sharply after World War II, when an integrated steel mill was established. The Korean war and the removal of export controls are also reflected in the data. The relationship indicates that supply was the easy factor in the scrap market before 1945 but that since that date the price had to rise to call forth needed supplies. The line plotted in figure 28 is

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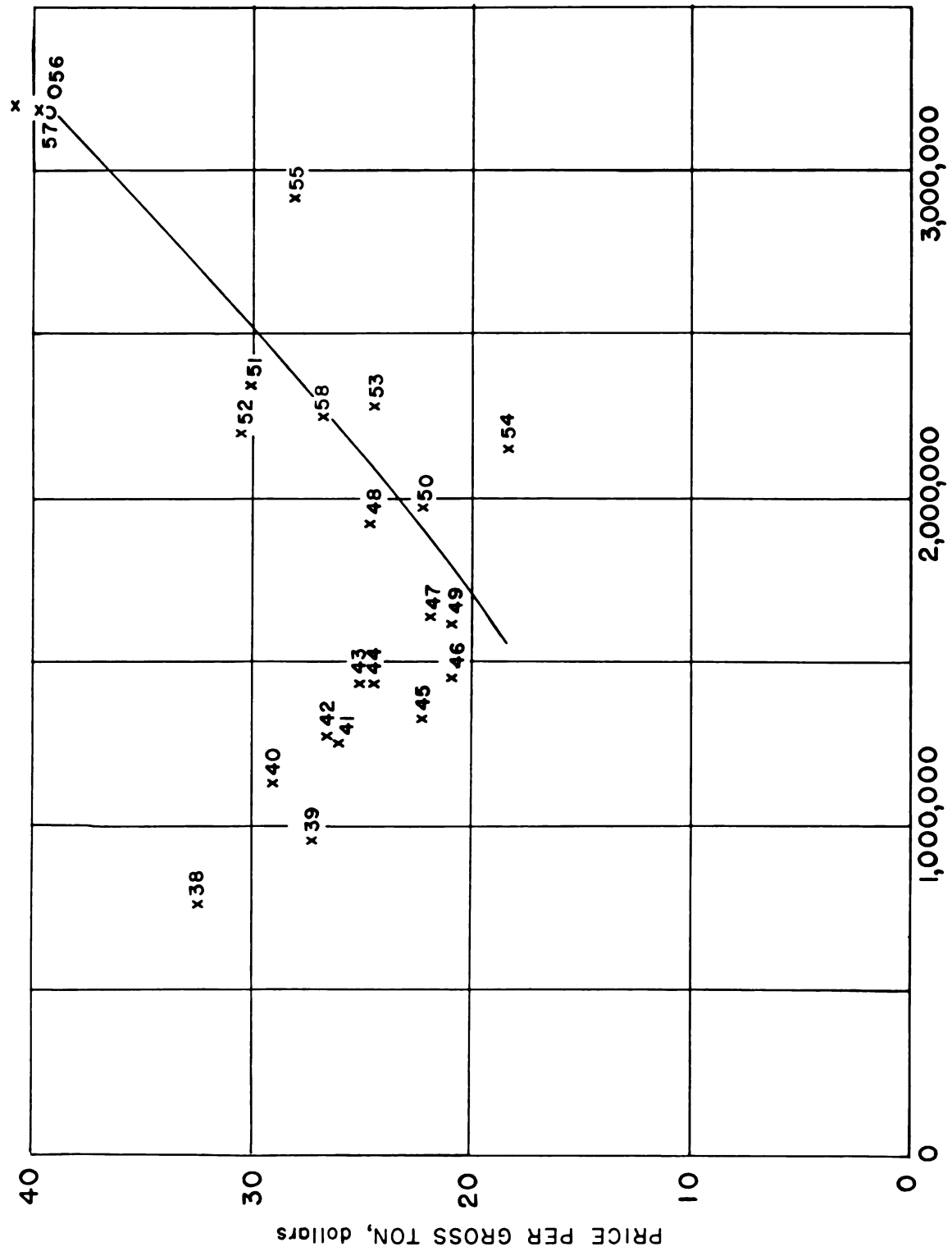

FIGURE 28. - Relation of Gross Consumption to Deflated Iron and Steel Scrap Prices in California.

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based upon the logarithmic relationships of the variables and indicates that, to increase apparent supply 10 percent, scrap price must rise about 9 percent relative to other prices.

The deflated prices are as follows:

1938.....$32.43	1945.....$22.14	1952.....$30.47
1939..... 27.11	1946..... 20.56	1953..... 24.69
1940..... 29.08	1947..... 21.96	1954..... 18.84
1941..... 26.00	1948..... 25.02	1955..... 28.86
1942..... 26.48	1949..... 21.56	1956..... 39.72
1943..... 25.37	1950..... 22.09	1957..... 39.78
1944..... 24.50	1951..... 30.10	1958..... 27.37

The conclusion seems to be that the prices of No. 1 Heavy Melting scrap have increased slower than wholesale prices from 1938 to 1958, except for unusual periods, and that the trend, if any, indicates that real costs, as reflected in prices, have declined during that period. This conclusion agrees with the recent findings of Charles W. Merrill[19/] as to the trend of mineral prices, 1890-1957.

Business Organization

The trend in the scrap iron and steel business is toward increased capital structure of the dealer, increased dealer consolidation, and continued competition. This trend is due to the increasing cost of both equipment and labor. Preparation equipment has increased in size, power, and cost. Common labor costs in scrapyards were $2.00 for a 10-hour day in 1920, and loading and unloading equipment consisted of a man with a wheelbarrow. In 1949 costs were $17.08 for an 8-hour day, and the equipment cost in a modern yard may easily run into multiples of $100,000.

YARD LAYOUTS

The layouts of two yards, one in the Los Angeles area and one in the San Francisco area, are given.

Los Angeles Area Yard

Berg Pipe & Steel Corp., 10313 South Alameda Street, is located in an industrial area in the southern part of Los Angeles and is served by spur tracks from the Los Angeles-San Pedro line of the Southern Pacific Railroad Co. It is accessible to trucks from South Alameda and East 103d Streets. The yard has been in operation since 1950 and is equipped for preparing both ferrous and nonferrous scrap, although nonferrous preparation is a relatively small operation. About 75 percent of the scrap receipts are from local industrial firms on a contract basis; the remainder is from local "truckers." The volume prepared annually is about 100,000 gross tons.

19/ Merrill, Charles W., Trends of Real Prices of Representative Mineral Commodities, 1890-1957: AIME Preprint 59K21, February, 1959.

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The Berg yard is one of the largest and most modern in southern California and is equipped with large-volume preparation machines, two of which are unique. The yard covers about 22 acres. A new pipe and steel warehouse covers about 1 acre, open storage of both used and new pipe and structural steel 5 acres, nonferrous preparation 1 acre, and ferrous preparation the remaining 15 acres. Figure 29 shows the shape of the yard, the equipment, and the relative position of the Southern Pacific tracks and South Alameda and East 103d Streets.

Rail movement is in and out on the track crossing South Alameda Street. Cars are moved to the railroad scales in the southwest corner of the yard and, after weighing, are moved to loading or unloading areas as required. About 25 cars can be loaded out per day.

Truck movements are from South Alameda or East 103d Street to one of the truck scales in the northeast part of the yard and from there to an unloading point as directed.

The yard has a network of buried pipes providing propane, oxygen, and water. Electric-power cables parallel the pipes. Service outlets are located in all preparation areas. Oxygen storage is provided by a tank kept at about 2,400 p.s.i. pressure. The oxygen supply and pressure is maintained periodically by a local service firm. Low-pressure propane at 250 p.s.i. is obtained from replaceable cylinders. Water is used as a fire preventive and for drinking. Electricity is used to operate the shears, baler, cast-iron breaker, and turnings crusher.

The Galland-Henning baling press is the largest and most modern in California. Its operation can be fully automatic, but it is usually operated by one man at a pushbutton control board. It is equipped with 12 motor-operated hydraulic pumps and can bale 200 tons of No. 1 Bundles or 160 tons of No. 2 Bundles in an 8-hour day. Bales usually weigh 900 to 1,000 pounds and, if the maximum allowable dimension specifications of the consumer are not exceeded, may weigh 1,500 pounds or more. The installed cost of the press was about $500,000.

An automatic loader is operated in conjunction with a Clearing hydraulic shear and was designed by B. W. Olney, of Berg Corp. It is now nearing completion and consists of a conveyor belt mounted in the bottom of a concrete pit about 7 feet below and in front of the discharge from the Clearing shear. It can swing through 180° and load scrap into cars on tracks on either side of the shear. An apron will receive the discharge from the shear. At the apron the scrap will be hand-sorted and dropped into a hopper at the bottom of the pit where the conveyor will pick it up. This device will make possible rapid sorting and loading and will eliminate the use of a crane.

A cast-iron breaker, also designed by B. W. Olney, is unique in that it is not a gravity-drop breaker but is a hydraullically and pneumatically operated blade which can break a motor block with one blow. The block is held by a lower jaw, and the point at which the cast iron is struck and the force of the blow are both controllable.

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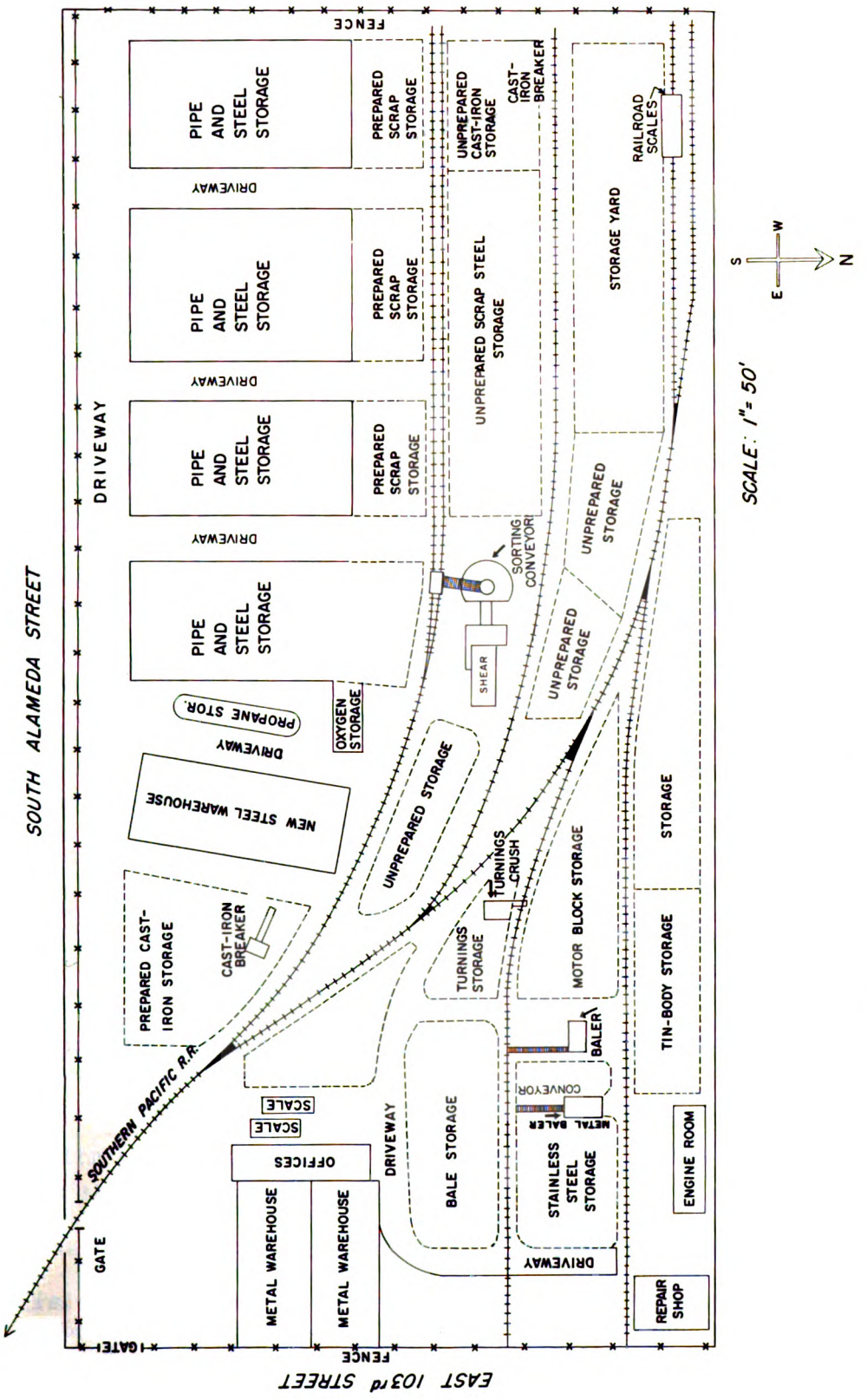

FIGURE 29. · Scrap Yard Layout, Los Angeles, Calif.

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The principal yard equipment for ferrous preparation is as follows:

1. Approximately 8,000 feet of standard-gage track.

2. One railroad scale, capacity 100 tons.

3. Two truck scales, one 50-foot and one 60-foot, each with a capacity of 20 tons.

4. Three trucks and 38 trailers for accumulating and picking up industrial scrap.

5. Two diesel locomotives for moving cars.

6. Buried piping for oxygen, propane, and water, serving about 8,100 feet.

7. Buried electrical cables, serving about 8,100 feet.

8. One baler-press with conveyor.

9. Four No. 3 "Alligator"-type shears.

10. One hydraulic shear, 600 tons pressure.

11. One turnings crusher with dragline.

12. Five torches with tube equipment.

13. Six locomotive cranes with magnets or grapples.

14. Five crawler cranes.

15. Three truck cranes.

16. Two hydraulic-pneumatic cast-iron breakers.

The labor force in the yard engaged in scrap preparation, including nonferrous scrap, averages about 75. The daily labor pay totals about $1,500 for 8 hours.

The total investment in yard equipment is estimated at $4 million to $5 million.

San Francisco Area Yard

The Learner Co. yard at 3675 Alameda Avenue is in an industrial area in the southern part of Oakland on the Oakland Estuary. It is served by spur tracks of the Southern Pacific Railroad Co. and is accessible to trucks from Alameda Avenue. The yard has been in operation since 1945 and is equipped for preparing both ferrous and nonferrous scrap, but it does not receive or prepare

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light iron and steel scrap or tin for baling. This material is baled at The Learner Co. tin-press yard, 768 46th Avenue, Oakland, about 1/2 mile from the Alameda Avenue yard.

The Learner yard on Alameda Avenue is one of the large yards of northern California and is equipped with modern large-volume preparation equipment. It covers about 11 acres, of which 8 are used for ferrous preparation and 3 for nonferrous. Figure 30 shows the shape and layout of the yard and its relation to street, tracks, and estuary.

Ferrous material moves in on tracks 2 and 2A and out on track 1. Truck movements are to the scale and to the ferrous and nonferrous areas as shown. Barges are loaded and unloaded near the southwest corner of the property.

As shown in figure 30, most of the oxygen, acetylene, air, and water pipelines and laid along the center of the rail tracks under the ties, with service outlets every 50 feet. The total footage served by these lines is about 4,000. Oxygen is supplied by the "cascade system," which comprises a bank of cylinders containing gaseous oxygen at a pressure of 2,000 to 2,200 p.s.i. The oxygen supply and pressure are maintained periodically by a local service firm with portable equipment. Acetylene is generated in two units, each having a charge capacity of 500 pounds of calcium carbide, which are operated by The Learner Co. Air is supplied by a compressor and water is city water. The pipe system for gases eliminated the necessity of moving gas cylinders from point to point and continually replacing cylinders after exhaustion. Air is used to operate jackhammers. Water is used as a fire preventive and for drinking.

The principal yard equipment is as follows:

1. Approximately 5,400 feet of standard-gage track.

2. Truck scale, capacity 50 tons.

3. Piping for torches, airhammers, and water supply serving approximately 4,000 feet.

4. Twenty torches with tube equipment.

5. Two acetylene generators with a capacity of 500 pounds of carbide per charge.

6. Two shears, 600 tons pressure.

7. Five diesel-locomotive cranes with magnets or grapples.

8. One crawler and truck crane with magnets or grapples.

9. One metal cleaning shear No. 1-1/2, nonferrous.

10. One metal cleaning shear No. 2, nonferrous.

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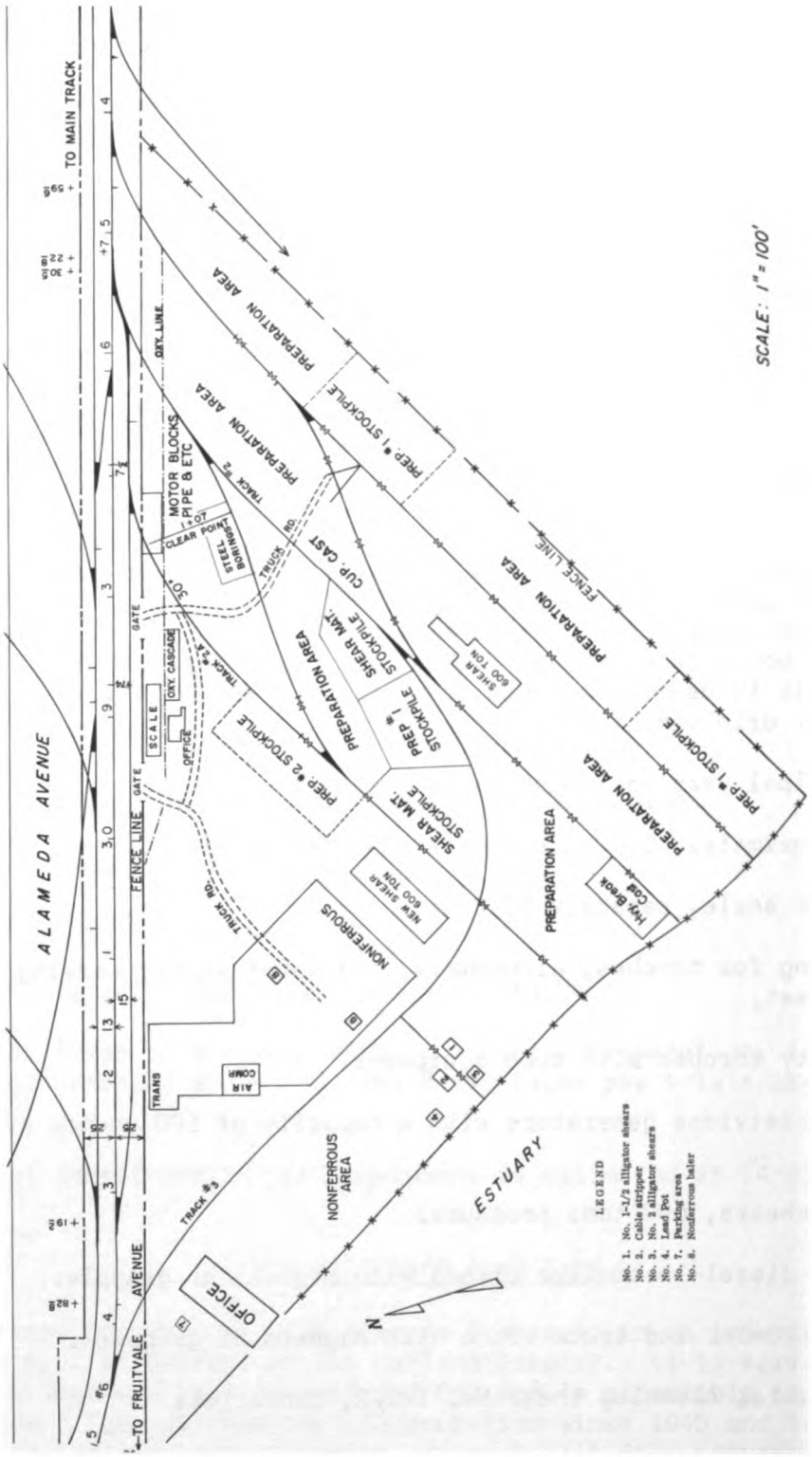

FIGURE 30. - Scrap Yard Layout, Oakland, Calif.

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11. Lead furnace.

12. Cable stripper.

13. Two air compressors.

The labor force averaged 65 men per day late in 1959, and the yard payroll was about $1,300 per 8-hour day.

The total investment in yard equipment is estimated at about $1 million.

RESEARCH[20/]

From 1955 to 1957, the Institute of Scrap Iron and Steel has sponsored five research projects conducted bv the Battelle Memorial Institute, Columbus, Ohio. These were:

1. 1955 - Development of nondestructive inspection and the determination of the metallic yield of No. 2 Bundles of steel scrap. The results were negative.

2. 1956 - Research to uncover and evaluate new uses for scrap iron and steel. Eight potential new use areas were studied: Concrete construction, highway construction, products requiring physical changes only, powder metallurgy, use of smaller sizes, recovering of alloving constitutents, chemical processes, and ferroalloy production. Tonnage uses were not developed.

3. 1957 - Preliminary survey to determine the feasibility of cleaning copper from scrapped automobiles by chemical action. Results indicated that bundles could not be handled on a commercially realistic production basis.

4. 1957 - Preliminary survey on the development of an incinerator for burning combustibles in scrapped automobile bodies. A specific design was recommended for an incinerator with a capacity of 10 to 15 cars a day. The cost was estimated at approximately $7,000. This investigation is especially valuable in connection with current regulations prohibiting open burning.

5. 1957 - A study of scrap quality requirements and current scrap practices in the steel industry. A final report was made on June 21, 1957, and was presented to executives of the steel industry in September 1957. The report was based on the experience of Battelle teams, who visited leading mills and appraised their technique in receiving and charging scrap.

6. 1959 - Project sponsored jointly by the Institute of Scrap Iron and Steel and the American Iron and Steel Institute: Quality-control techniques and quality-improvements methods for preparing iron and steel scrap were to be studied. Synthetic bundles have been made which are to be melted down in a cupola. They may provide a yardstick for measuring and evaluating metallic

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20/ Personal communication from Edwin C. Barringer, executive vice-president, Inst. Scrap Iron and Steel, Oct. 23, 1959.

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yield from bundle shipments. The objective is to evaluate the metallic content of No. 2 Bundles, to develop an efficient and quick method of inspection, and to provide a more accurate method of evaluating the metal value of such bundles by open-hearth superintendents. A standardized method of evaluation may result in developing a greater demand for scrap of this grade, which has become the principal product of the Nation's scrap yards.

In addition to the research projects listed, the steel companies have carried on extensive independent investigations covering all phases of the scrap industry, including use and evaluating programs of the several scrap grades. However, many of the findings are regarded as confidential, and no systematic effort has been made to compile data on them. For many years the Bureau of Mines has actively cooperated with scrap dealers' preparation problems and consumers' use and evaluation problems.

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APPENDIX 1

Iron and steel scrap grade specifications from Institute of Scrap Iron and Steel Yearbook, 1959

Basic Open-Hearth and Blast-Furnace Grades

No. 1 Heavy Melting Steel. - Clean wrought-iron or carbon-steel scrap 1/4 inch thick and over, not over 18 inches wide, and not over 5 feet long. Individual pieces must be free from attachments and so cut as to lie flat in the charging box. May include new mashed pipe ends, 4 inches and over.

No. 2 Heavy Melting Steel. - Wrought-iron or carbon steel scrap, black or galvanized, 1/8 inch thick and over, not over 18 inches wide, and not over 3 feet long. Individual pieces must be free from attachments and so cut as to lie flat in the charging box. May include pipe cut 3 feet and under. May not include automotive body and fender stock.

No. 1 Busheling. - Clean new wrought-iron or steel scrap 1/16 inch and over in thickness and not exceeding 12 inches in any dimension, including new factory busheling 20 gage or heavier (for example, sheet clippings, stampings, etc.) and steel cartridge cases 40 mm. or less. May not contain burnt material or automotive body and fender stock. Must be free of metal coated, limed, or porcelain enameled stock.

No. 1 bundles. - New black steel-sheet scrap, clippings, or skeleton scrap, hydraulically compressed or hand-bundled to charging-box size and weighing not less than 75 pounds per cubic foot. (Hand bundles must also be tightly secured to stand handling with a magnet.) Must be free of paint or protective coating of any kind. May include Stanley balls, mandrel-wound bundles, or skeleton reels, tightly secured. May not include electrical sheets or any material with over 0.5 percent silicon. May include chemically detinned material. No tin can will be deemed to be detinned unless it has undergone the chemical process for the removal and recovery of tin.

No. 2 Bundles. - Body and fender carbon-steel scrap or old black and/or galvanized carbon-steel scrap, hydraulically compressed to charging-box size and weighing not less than 75 pounds per cubic foot. May not include turnings, bead wire, vitreous enameled stock, tin cans, tinplate, terne plate, or other metal-coated material. Painted or lacquered material shall not be considered as coated material. May include hydraulically compressed black or galvanized fence wire and light coil springs.

No. 3 Bundles. - Offgrade material, compressed to charging-box size and weighing not less than 75 pounds per cubic foot. May include tin cans and tinned, galvanized, vitreous enameled, and other coated ferrous scrap not suitable for inclusion in No. 2 bundles. Must be free of dirt, nonferrous metals, and nonmetallics of any kind.

Incinerator bundles. - Tin-can scrap, compressed to charging-box size and weighing not less than 75 pounds per cubic foot. Must have been processed through a recognized garbage incinerator. Must be free of dirt, nonferrous metals, and nonmetallics of any kind.

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Machine-Shop Turnings. - Clean steel or wrought-iron turnings, free of cast or malleable iron borings, nonferrous metals in a free state, scale, or excessive oil. May not contain badly rusted or corroded stock.

Mixed borings and turnings. - Shoveling turnings mixed with cast or malleable iron borings and drillings, free of scale, excessive oil, or nonferrous metals in a free state. May not contain badly rusted or corroded stock.

Shoveling Turnings. - Clean short steel or wrought-iron turnings, drillings, or screw cuttings. May include any such material, whether resulting from crushing, raking, or other processes. Must be free of springy, bushy, tangled, or matter material, lumps, nonferrous metals in a free state, scale, grindings, or excessive oil.

No. 2 Busheling. - Cut hoops, netting, cut unbaled fence wire, light sheets, rusted car sides, cotton ties, and galvanized light material. No dimension over 12 inches. May be black or galvanized. May include oilfield or similar cable, cut to lengths of 2 feet or less, and machine gun clips. No hard steel, porcelain enameled, or metal-coated material may be included.

Cast-Iron Borings. - Clean cast-iron or malleable iron borings and drillings, free of steel turnings, scale, lumps, and excessive oil.

Electric Furnace and Foundry Grades

Billet, Bloom, and Forge Crops. - Billet, bloom, axle, slab, heavy plate, and heavy forge crops, containing not over 0.05 percent phosphorus or sulfur and 0.5 percent silicon, free from alloys. Must not be less than 2 inches thick, not over 18 inches wide, and not over 36 inches long.

Bar Crops and Plate Scrap. - Bar crops, plate scrap, forgings, bits, jars, and tool joints, containing not over 0.05 percent phosphorous or sulfur and 0.5 percent silicon, free from alloys. Must not be less than 1/2 inch thick, not over 18 inches wide, and not over 36 inches long.

Cast Steel. - Steel castings not over 48 inches long or 18 inches wide and 1/4 inch thick and over, containing not more than 0.05 percent phosphorous or sulfur and free from alloys and attachments. May include heads, gates, and risers.

Punchings and Plate Scrap. - Punchings or stampings, plate scrap and bar crops containing not over 0.05 percent phosphorus or sulfur and 0.5 percent silicon, free from alloys. All material must be cut 12 inches and under and, except for punchings or stampings, must be at least 1/8 inch thick. Punchings or stampings may be of any gage but must not be more than 6 inches in diameter.

Electric-Furnace Bundles. - New black steel-sheet scrap hydraulically compressed into bundles 14 by 14 by 20 inches or smaller.

Cut Structural and Plate Scrap, 3 Feet and Under. - Clean open-hearth steel plates, structural shapes, crop ends, shearings, or broken steel tires.

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Must be not less than 1/4 inch thick nor over 3 feet long and 18 inches wide. Must not contain over 0.05 percent phosphorus or sulfur.

Cut Structural and Plate Scrap, 2 Feet and Under. - Clean open-hearth steel plates, structural shapes, crop ends, shearings, or broken steel tires. Must be not less than 1/4 inch thick nor over 2 feet long and 18 inches wide. Must not contain over 0.05 percent phosphorus or sulfur.

Cut Structural and Plate Scrap, 1 Foot and Under. - Clean open-hearth steel plates, structural shapes, crop ends, shearings, or broken steel tires. Must be not less than 1/4 inch thick, nor over 1 foot long or wide. Must not contain over 0.05 percent phosphorus or sulfur.

Foundry Steel, 2 Feet and Under. - Steel scrap 1/8 inch thick and over and not more than 2 feet long or 18 inches wide. Individual pieces must be free from attachments. May not include nonferrous metals, metal-coated materials, cast or malleable iron, body and fender stock, cable, and enameled or galvanized material.

Foundry Steel, 1 Foot and Under. - Steel scrap 1/8 inch thick and over and not more than 1 foot long or wide. Individual pieces must be free from attachments. May not include nonferrous metals, metal-coated material, cast or malleable iron, body and fender stock, cable, and enameled or galvanized material.

Springs and Crankshafts. - Clean automotive springs and crankshafts, either new or used.

Alloy-Free Turnings. - New, short, clean steel turnings free from lumps, tangled or matted materials, cast-iron borings, or excessive oil, containing not more than 0.05 percent phosphorus or sulfur and free of alloys.

Heavy Turnings. - Short, heavy steel turnings, containing not over 0.05 percent phosphorus or sulfur and free of alloys. May include rail chips. May not include machine-shop or other light turnings and must weigh not less than 75 pounds per cubic foot in the original state of production.

Special Grades

Briquetted Cast-Iron Borings. - Cast-iron borings, compressed into a cohesive solid and reasonably free from oil, each briquet to weigh not more than 20 pounds and to have a density of not less than 60 percent.

Briquetted Turnings. - Steel turnings compressed into a cohesive solid and reasonably free from oil, each briquet to weigh not more than 20 pounds and to have a density of not less than 60 percent.

No. 1 Chemical Borings. - New clean cast- or malleable-iron borings and drillings, containing not more than 1 percent oil and free from steel turnings, chips, lumps, scale, and corroded or rusty material.

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No. 2 Chemical Borings. - New clean cast- or malleable-iron borings and drillings, containing not more than 1.5 percent oil and free from steel turnings, chips, lumps, scale, and corroded or rusty material.

Wrought Iron. - Clean wrought-iron scrap, free from steel and with rivets and attachments removed. May include structural shapes, plates, bars, pipes, staybolts, or other material known to have been manufactured from wrought iron.

Shafting. - Random-length shafting suitable without further preparation for rerolling or forging. Must be reasonably straight and free of attachments.

Cast-Iron Grades

Cast Iron No. 1 (Cupola Cast). - Clean cast-iron scrap, such as columns, pipes, plates, and castings of a miscellaneous nature, including the cast-iron parts of agricultural machinery. Must be free from stove plate, burnt iron, brake shoes, or foreign material. Must be cupola size (not over 24 by 30 inches) and no piece must weigh over 150 pounds.

Cast Iron No. 2 (Charging-Box Cast). - Clean cast-iron scrap in sizes not over 5 feet long or 18 inches wide, suitable for charging into an open-hearth furnace without further preparation. Must be free from burnt iron, brakeshoes, or stove plate.

Cast Iron No. 3 (Heavy Breakable Cast). - Cast-iron scrap over charging-box size or weighing more than 500 pounds, which can be broken by an ordinary drop into cupola size. May include cylinders and driving-wheel centers but may not include hammer blocks or bases. May include steel which is an integral part of the casting, does not protrude more than 6 inches, and does not exceed 10 percent of the weight of the casting.

Cast Iron No. 4 (Burnt Cast). - Burnt cast-iron scrap, such as stove parts, grate bars, and miscellaneous burnt iron. Includes sash weights or window weights.

Cast Iron Brakeshoes. - Driving and/or car brakeshoes of all types except composition-filled shoes.

Stove Plate. - Clean cast-iron stove plate. Must be free from malleable and steel parts, window weights, plow points, or burnt cast.

Clean Automotive Cast. - Clean automotive blocks, free of all steel parts except camshafts, valves, valve springs, and studs.

Unstripped Motor Blocks. - Automobile or truck motors from which steel and nonferrous fittings have not been removed. Must be free of drive shafts, transmissions, and all parts of frames.

Wheels, No. 1. - Cast-iron railroad car or locomotive wheels.

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Malleable. - Malleable parts of automobiles, railroad cars, locomotives, or miscellaneous malleable-iron castings. Must be free of cast-iron and steel parts and other foreign material.

Drop Broken Machinery Cast. - Clean heavy cast-iron machinery scrap that has been broken under a drop. All pieces must be cupola size, (not over 24 by 30 inches) and no piece is to weigh over 150 pounds or less than 5 pounds.

Association of American Railroads Specifications

(1) Steel Alloy. (Specify kind in offering.)

(2) Axles, Steel: Solid car and/or locomotive, over 6 1/8-inch diameter at center (free of axles with keyway between wheel seats, and no axles of shorter lengths than distances between wheel seats to be included).

(3) Axles, Steel: Solid car and/or locomotives, 6 1/8-inch diameter and under at center (no axles to be included of shorter lengths than distances between wheel seats).

(4) Axles, Steel: Hollow bored. (No axles to be included of shorter length than distance between wheel seats.)

(5) Tie Plates: Iron and/or steel.

(6) Rail Joints: Angle and/or splice bars, iron and/or steel.

(7) Fireboxes: Uncut.

(8) Boilers, with or without fireboxes attached, Locomotive Cisterns, and/or tanks: Cut apart sufficiently to load. May include all kinds of material from interior of boilers or tanks that are encrusted, such as crown bars, bolts, except flues.

(9) Bolsters and/or Truck Side Frames: Uncut. Cast steel.

(10) Cut structural and plate scrap, 2 feet and under: Clean open-hearth steel plates, structural shapes, crop ends, shearings or broken steel tires. Must be not less than 1/4 inch thick and not over 2 feet long and 18 inches wide.

(11) Cast Steel, No. 2: Steel castings over 18 inches wide and 5 feet long.

(11A) Cast Steel No. 1: Steel castings, 18 inches and under, not over 5 feet long, including cut truck side frames and bolsters.

(12) Cast Iron No. 1: Cast-iron scrap, such as columns, pipes, plates, and/or castings of miscellaneous nature but free from stove plate, brake shoes, and burnt scrap. Must be cupola size (not over 24 by 30 inches), and no piece is to weigh over 150 pounds. Must be free from foreign material.

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(13) Cast Iron No. 2: Pieces weighing over 150 pounds but not more than 500 pounds. Free from burnt cast.

(14) Cast Iron No. 3: Pieces weighing over 500 pounds; includes cylinders, driving-wheel centers, and/or all other castings. (Free from hammer blocks or bases.)

(14A) Cast Iron Hammer and/or Die Blocks weighing over 500 pounds.

(14B) Cast Iron: Pieces weighing over 500 pounds; including cylinders, driving-wheel centers, and/or all other castings. May include steel which is an integral part of the casting, does not protrude more than 6 inches and does not exceed 10 percent of the weight of the casting. (Free from hammer blocks or bases.)

(15) Cast Iron No. 4: Burnt cast-iron scrap, such as grate bars, stove parts and/or miscellaneous burnt scrap.

(16) Cast Iron Brake Shoes: Driving and/or car brake shoes of all types except composition-filled shoes.

(17) Couplers and/or Knuckles: Railroad car and/or locomotive steel couplers, knuckles, and/or locks stripped clean of all other attachments.

(18) Frogs and/or Switches, uncut: Steel and/or iron frogs and switches that have not been cut apart, exclusive of manganese.

(18A) Railbound Manganese Frogs and Switch Points with Manganese inserts that have not been cut apart.

(19) Flues, Wrought Iron and/or Steel--rattled. (In reporting, specify diameters and minimum length.)

(20) Flues, Wrought Iron and/or Steel--unrattled. (In reporting, specify diameter and minimum length.)

(21) Flues, Tubes and/or Pipe: Wrought iron and/or soft steel. Must be free from dirt, excessive corrosion or lime, and riveted seams. Attached fittings permitted.

(22) Air Tanks and/or Reservoirs--uncut.

(23) Malleable: Malleable parts of automobiles, railroad cars, locomotives, and/or miscellaneous malleable castings.

(24) Melting Steel, Railroad No. 1: Clean wrought iron or steel scrap, 1/4 inch thick and over, not more than 18 inches wide, and not over 5 feet long. May include pipe ends and material 1/8 inch to 1/4 inch thick, not over 15 inches by 15 inches. Individual pieces cut so as to lie reasonably flat in charging box.

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(24A) Melting Steel, Railroad No. 1: Clean wrought iron or steel scrap 1/4 inch and over in thickness, not over 24 inches wide, and not over 6 feet long. May include pipe ends and material 1/8 to 1/4 inch thick and not over 15 by 15 inches. Individual pieces cut to lie reasonably flat in charging box.

(25) Melting Steel Railroad, No. 2: Plate scrap, such as car sides 1/8 to 1/4 inch thick. Punchings 1/4 inch thick and over, heavy clippings, unmashed pipe ends under 4 inches in diameter, and/or similar material. Car sides and all light plates to be sheared 15 by 15 inches or under, and all light rods to be 12 inches and under in length. Any curved or twisted pieces must be sheared in such shape that they will lie reasonably flat in a charging box and not tangle in handling with a magnet; all to be free from cast iron, malleable iron, burnt scrap, dirt, or foreign material of any kind. Maximum size, 15 inches wide by 3 feet long.

(26) Rail, Steel No. 1: Standard section T-rails, original weight 50 pounds per yard or heavier, 8 feet long and over. Suitable for rerolling into bars and shapes. Free from bent and twisted rails, frog, switch and guard rails, or rails with split heads and broken flanges.

(27) Rail, Steel No. 1: Standard section T-rails, original weight 50 pounds per yard or heavier, 5 feet long and over. Suitable for rerolling into bars and shapes. Free from bent and twisted rails, frog, switch and guard rails, or rails with split heads and broken flanges.

(28) Rail, Steel No. 2: Cropped rail ends--standard section, original weight 50 pounds per yard and over, 3 feet long and under.

(29) Rail, Steel No. 3: Standard section T-, girder, and/or guard rails, to be free from frog and switch rails not cut apart and to contain no manganese, cast, welds, or attachments of any kind except angle bars. Free from concrete, dirt, and foreign material of any kind.

(30) Sheet Scrap, No. 1: Under 3/16 inch thick, consisting of cut stacks and/or netting, hoops, band iron and/or steel, scoops and/or shovels (free of wood), and/or wire rope, all sizes. Must be free from burnt or metal-coated material, cushion or other similar springs, and lime-encrusted pipe and flues from boilers.

(31) Sheet Scrap, No. 2: Galvanized or tinned material, composition brake shoes and/or gas retorts, and/or any other iron or steel material not otherwise classified.

(32) Steel, Tool. (Specify kind in offering.)

(33) Steel Manganese: All kinds of manganese, rail, guard rails, and frogs and/or switch points, cut or uncut.

(34) Steel, Spring: Coil and/or elliptical, minimum thickness 1/4 inch; may be assembled or cut apart.

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(35) Structural, Wrought Iron, and/or Steel Uncut: All steel or steel mixed with iron from bridges, structures, and/or equipment that has not been cut apart; may include uncut bolsters, brake beams, steel trucks, underframes, channel bars, steel bridge plates, frog and/or crossing plates, and/or other steel of similar character.

(36) Tires: All locomotive and/or car tires, not cut to specified lengths.

(37) Tires: All locomotive and/or car tires, cut 3 foot lengths and under.

(38) Turnings, No. 1: Heavy turnings from wrought iron and/or steel railroad axles or heavy forgings and/or rail chips, to weigh not less than 75 pounds per cubic foot. Free from dirt or other foreign material of any kind. Alloy steel scrap may be excluded from these specifications by mutual agreement between buyer and seller.

(39) Turnings, Drillings, and/or Borings, No. 2: Cast, wrought, steel, and/or malleable iron borings, turnings, and/or drillings mixed with other metals.

(39A) Turnings, Drillings, and Cuttings: Clean, short steel and/or wrought iron turnings, and/or drillings, and/or cuttings. Must be free from stringy, bushy, tangled or matted material, lumps, nonferrous metals, scale, or excessive oil.

(39B) Borings: Cast iron, clean and free from other metals and foreign material.

(40) Wheels, No. 1: Cast-iron car and/or locomotive wheels.

(41) Wheels, No. 2: Includes all kinds of built-up and/or steel-tired wheels 36 inches and under. (Specify kind in offering.)

(42) Wheels, No. 3: Solid cast steel, forged, pressed, and/or rolled steel car and/or locomotive wheels, not over 42 inches in diameter. (Specify kind in offering.)

(42A) Wheels, No. 3: Solid cast steel, forged, pressed, and/or rolled steel car and/or locomotive including wheels, over 42 inches in diameter. (Specify kind in offering.)

(43) Wrought Iron: All wrought iron free from attachments.

(44) Scrap steel boxcar doors.

(45) Destroyed Steel Cars: Bodies of steel cars cut apart sufficiently to load. (Specify kind.)

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APPENDIX 2

Gross Consumption of California Iron and Steel Scrap, 1935-58

Year	Short tons	Consumption, gross tons	Exports, gross tons	Total, gross tons
1935.....	612,886	547,220	149,510	696,730
1936.....	868,190	775,170	134,055	909,225
1937.....	861,118	768,855	112,768	881,623
1938.....	690,042	616,109	154,058	770,167
1939.....	882,244	787,718	194,340	982,058
1940.....	997,032	890,207	264,606	1,154,813
1941.....	1,264,040	1,128,607	145,135	1,273,742
1942.....	1,442,649	1,288,079	2,283	1,290,362
1943.....	1,630,351	1,455,671	9,710	1,465,381
1944.....	1,616,265	1,443,094	0	1,443,094
1945.....	1,501,662	1,340,770	0	1,340,770
1946.....	1,545,499	1,379,910	0	1,379,910
1947.....	1,846,114	1,648,316	0	1,648,316
1948.....	2,144,442	1,914,680	7,049	1,921,729
1949.....	1,822,065	1,626,844	1,912	1,628,756
1950.....	2,217,674	1,980,066	686	1,980,752
1951.....	2,638,565	2,355,862	1,969	2,357,831
1952.....	2,470,169	2,205,508	1,793	2,207,301
1953.....	2,574,840	2,298,964	30	2,298,994
1954.....	2,185,451	1,951,296	217,855	2,169,151
1955.....	2,777,589	2,479,990	447,376	2,927,366
1956.....	2,789,406	2,490,541	761,280	1/3,251,821
1957.....	2,656,218	2,371,623	809,321	2/3,180,944
1958.....	2,127,276	1,899,354	369,409	2,268,763

1/ 2,389,821 including rail export.
2/ 3,298,944 including rail export.

Sources: Consumption, Bureau of Mines Minerals Yearbook; Exports, Corps of Engineers.

APPENDIX 3

Production of Ingot Steel in California, 1935-58

(Annual Statistical Report, American Iron and Steel Institute)

Year	Net tons	Year	Net tons
1935.....	500,585	1947.....	1,792,953
1936.....	679,683	1948.....	2,013,800
1937.....	671,681	1949.....	1,909,913
1938.....	485,840	1950.....	2,388,730
1939.....	658,801	1951.....	2,832,234
1940.....	775,401	1952.....	2,753,123
1941.....	911,015	1953.....	2,874,329
1942.....	1,041,046	1954.....	2,265,521
1943.....	1,368,199	1955.....	2,907,451
1944.....	1,538,292	1956.....	3,136,483
1945.....	1,407,220	1957.....	3,059,638
1946.....	1,487,054	1958.....	2,535,686

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APPENDIX 4

Average Annual Price Per Gross Ton of Iron and Steel Scrap Delivered to Consumer, 1938-58[1]

LOS ANGELES

Period covered	No. 1 Heavy Melting	No. 2 Bundles	Cast Iron No. 1 (cupola cast)
1938 - Jan. 3 to Dec. 26	$12.66	$9.15	(2)
1939 - Jan. 2 to Dec. 25	13.66	14.00	(2)
1940 - Jan. 1 to Dec. 30	13.51	(2)	(2)
1941 - Jan. 6 to Dec. 29	14.75	12.93	$18.24
1942 - Jan. 5 to Dec. 28	17.00	17.00	20.00
1943 - Jan. 4 to Dec. 27	17.00	17.00	20.00
1944 - Jan. 3 to Dec. 25	16.45	15.90	20.00
1945 - Jan. 4 to Dec. 27	14.40	12.40	20.00
1946 - Jan. 3 to Dec. 26	16.05	14.65	21.10
1947 - Jan. 2 to Dec. 25	21.22	21.22	33.05
1948 - Jan. 1 to Dec. 30	26.20	26.20	47.03
1949 - Jan. 6 to Dec. 29	21.65	18.38	34.29
1950 - Jan. 5 to Dec. 28	22.91	18.84	39.87
1951 - Jan. 4 to Dec. 27	34.52	32.08	49.16
1952 - Jan. 3 to Dec. 25	34.00	30.73	47.26
1953 - Jan. 1 to Dec. 31	26.38	21.68	39.49
1954 - Jan. 7 to Dec. 30	20.77	16.33	41.12
1955 - Jan. 6 to Dec. 29	32.40	25.90	42.85
1956 - Jan. 5 to Dec. 27	45.49	34.08	49.17
1957 - Jan. 3 to Dec. 27	46.47	32.84	51.43
1958 - Jan. 7 to Dec. 29	32.98	18.95	41.35

SAN FRANCISCO

1938 - Jan. 3 to Dec. 26	12.25	(2)	(3)
1939 - Jan. 2 to Dec. 25	13.50	(2)	(2)
1940 - Jan. 1 to Dec. 30	16.21	(2)	(2)
1941 - Jan. 6 to Dec. 29	14.79	12.78	18.24
1942 - Jan. 5 to Dec. 28	17.00	17.00	20.00
1943 - Jan. 4 to Dec. 27	17.00	17.00	20.00
1944 - Jan. 3 to Dec. 25	16.66	16.04	20.00
1945 - Jan. 4 to Dec. 27	16.06	13.71	20.00
1946 - Jan. 3 to Dec. 26	16.30	15.12	21.06
1947 - Jan. 2 to Dec. 25	21.03	21.03	32.14
1948 - Jan. 1 to Dec. 30	26.04	26.04	45.08
1949 - Jan. 6 to Dec. 29	21.19	17.92	31.72
1950 - Jan. 5 to Dec. 28	22.63	18.88	36.28
1951 - Jan. 4 to Dec. 27	34.60	32.08	48.60
1952 - Jan. 3 to Dec. 25	34.00	30.73	44.15
1953 - Jan. 1 to Dec. 31	27.89	22.43	39.14
1954 - Jan. 7 to Dec. 30	20.79	16.48	42.00

See footnotes at end of table.

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APPENDIX 4 (Con.)

Average Annual Price Per Gross Ton of Iron and Steel Scrap Delivered to Consumer, 1938-58[1]

SAN FRANCISCO (Con.)

Period covered	No. 1 Heavy Melting	No. 2 Bundles	Cast Iron No. 1 (cupola cast)
1955 - Jan. 6 to Dec. 29.....	$31.50	$26.13	$42.40
1956 - Jan. 5 to Dec. 27.....	45.31	35.81	51.12
1957 - Jan. 3 to Dec. 27.....	47.08	34.68	53.74
1958 - Jan. 7 to Dec. 29.....	32.27	22.04	43.65

1/ According to G. F. Sullivan, editor of Iron Age, the prices published by that periodical are derived from contact each week with (1) brokers who buy from dealers and generators of scrap and sell to mills and foundries; (2) consumers of scrap, the steel mills and foundries; (3) dealers who buy from generators, peddlers, etc., and sell to brokers or to consumers directly; and (4) generators of scrap, primarily the large steel-consuming plants and the railroads.

2/ No record.

3/ No record except No. 1 cast scrap.

Sources: Steel, 1938-44; Iron Age, 1945-58.

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